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Montana State plan for the institutional conservation program

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Montana State Plan for the Institutional Conservation Program

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MONTANA STATE PLAN
FOR THE
INSTITUTIONAL CONSERVATION PROGRAM

State of Montana
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Energy Division
1520 East Sixth Avenue
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Helena, MT 59620-2301
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June 1989

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INTRODUCTION

The Institutional Conservation Program is a U.S. Department of Energy program that provides matching funds for energy conservation activities in school and hospitals. In Montana the program is administered by the state Department of Natural Resources and Conservation. ICP provides financial assistance to public and private nonprofit schools and hospitals for:

1. Technical assistance (TA) reports, detailed engineering and architectural analyses that identify the most cost-effective energy conservation measures for their buildings.

2. The design, purchase and installation of energy conservation measures (ECMs) identified in the technical assistance reports.

In most cases ICP pays for half the cost of TAs and ECMs, but in severe hardship cases, like schools or hospitals in counties with unemployment rates 25 percent above the state average, ICP will pay for up to 90 percent of the cost of TAs or ECMs.

A school, for example, might go through the following steps in the ICP program:

1. The school has an energy audit done to identify the operations and maintenance changes that will save energy. A registered architect or engineer or a person certified to do ICP energy audits performs the audit and records his or her findings in an ICP energy audit workbook. The school or hospital pays for the energy audit.

2. The school institutes all the operation and maintenance procedures identified in the energy audit.

3. The school applies for a grant for a technical assistance report, an in-depth analysis of the building's energy use. The TA report will also include recommendations on the most cost-effective energy conservation measures that could be applied to that building.

4. DNRC reviews the energy audit and the application and recommends it to DOE for funding.

5. DOE approves the application.

6. The school selects an engineering firm or an architect engineer team from among those certified by the DNRC to do the technical assistance report.

7. The firm completes the TA report.

8. The school applies for funding for the most cost-

effective energy conservation measures recommended in the TA report.

9. DNRC review the ECM funding application and recommends it to DOE for funding.

10. After DOE approves the application, the school hires a professional engineer or architect to design the ECMs and a contractor to install them.

11. Within 90 days of completing the project, the school submits a final report on the project to DNRC.

12. Annually, for three years, the school submits an energy consumption report to DNRC.

Normally a school or hospital would get a TA grant one year and an ECM grant the next year, but a school or hospital can shorten the process by paying for its own technical assistance report. Institutions paying for their own technical assistance can skip the first four steps listed above and apply for ECM funding in the first year. The institution may count the amount it pays for the TA report as part of its required match for the ECM grant.

DNRC will provide the forms necessary for the applications and will help school and hospital officials complete the forms if requested.

Funding for ICP comes from DOE and Montana's share of the oil overcharge funds.[1]

The program is authorized by Public Law 95-619, the National Energy Conservation Policy Act of November 1978 and operates under the federal regulations set forth in 10 CFR Part 455 (See Appendix E) and Financial Assistance Rules, 10 CFR, Part 600. This state plan describes the policies and procedures DNRC will use to fulfill the requirements of the federal regulations. In the event of any conflict between the state plan and the federal regulations, the federal regulations take precedence over this plan.

The Montana State Plan for the Institutional Conservation Program was first approved in 1979 and amended in 1981, 1985 and 1987. This 1989 revision of the plan is designed primarily to incorporate a revised ranking formula.

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[1] As the result of overcharges on the sales of domestic crude oil, the federal courts ordered or approved settlements requiring the repayment of the total amount of overcharges plus interest into an escrow account to be distributed by the U.S. Treasury to the states, territories and possessions of the United States. The Montana Legislature voted to use some of the state's oil overcharge money to supplement the ICP program.

I. COMMUNICATION WITH ELIGIBLE INSTITUTIONS

SOLICITING INSTITUTIONAL COMMENTS ON THE STATE PLAN

In 1979 DNRC asked representative state agencies and associations eligible to participate in the program for input in program planning. Representatives of the following organizations served on the advisory committee:

Schools and Hospitals

- The Office of Public Instruction
- The Montana Department of Health and Environmental Sciences, Hospital and Medical Facilities Division
- The Montana Department of Commerce, Division of Business Regulation, (Formerly the Department of Administration, Building Codes Division)
- The Montana Catholic Conference
- The Montana Hospital Association

Local Government and Public Care Institutions

- DHES, Hospital and Medical Facilities Division
- The Montana Association of Counties
- The Montana League of Cities and Towns
- The Bureau of Indian Affairs
- The Montana Nursing Home Association

PROCEDURES FOR INFORMING INSTITUTIONS OF STATE PLAN REVISIONS

All revisions of this plan are reviewed according to Executive Order 12372. This executive order requires DNRC to provide interested parties an opportunity to review and comment on DNRC's proposed State Plan. All registered ICP technical assistance analysts are notified of DNRC's intent to revise the plan. DNRC also purchases legal notices in daily newspapers throughout the state to advertise pending plan revisions.

The State Library and organizations represented on the original advisory committee are given copies of the final

State Plan. Copies are also made available on request by DNRC to interested private citizens throughout the state.

II. REQUIREMENTS AND PROCEDURES FOR APPLICATIONS

ELIGIBILITY REQUIREMENTS

Public and private nonprofit schools and hospitals are eligible to apply for TA and ECM grant funding.

To be eligible for TA funding, an institution must submit a copy of an energy audit in compliance with state and federal requirements. The audit identifies operations and maintenance changes that will save energy. A registered architect or engineer or a certified ICP energy auditor performs the audit and records his or her findings in a Montana ICP Energy Audit Workbook. This audit will serve as documentation for a TA program application. If an institution completes a TA report without DOE funding, no energy audit is required.

An approved TA report will serve as documentation for an ECM application. The TA report may be funded through ICP or paid for by the institution. In either case the TA report must meet program requirements as outlined in this State Plan.

FORMAT FOR APPLICATION

DNRC will provide ICP application forms.

CONTENT OF APPLICATION

Grant applications must include the following: general information, budget, project narrative, assurances, certifications, and accompanying documentation. Grant applications must also include all the information needed to evaluate the application for technical assistance or for energy conservation measures and severe hardship funding, if appropriate. DNRC will help institutions prepare applications, if requested. When an application is signed, the applicant acknowledges that all federal and state requirements for financial assistance will be followed.

OPERATION AND MAINTENANCE PROCEDURES

The applicant also acknowledges that all required operation and maintenance procedures identified in an energy audit or technical assistance report have been met unless approval for non-implementation has been received. If a measure cannot be implemented immediately or is an on-going measure, like light fixture cleaning, a timetable for implementation shall be established. If a measure cannot be implemented for any reason, the grant application must specifically explain the reason for non-implementation. The reasons for not implementing recommended procedures will be evaluated individually, and DOE will judge whether or not they can grant an exception. All operation and maintenance procedures must be implemented, scheduled for implementation or an approved exemption must have been received for that application to be recommended by DNRC for funding. (See Appendix E, 455.90(j).

REVIEW BY STATE AGENCIES

Schools

The Montana Office of Public Instruction determined in 1988 that all TA and ECM grant applications are consistent with related state programs for educational facilities; and, therefore, OPI does not wish to review applications. DOE has agreed to this request.

Hospitals

The Montana Department of Health and Environmental Sciences is required according to Montana Codes, Section 55-301 to review ECM applications and issue a Certificate of Need if the retrofit is estimated to cost more than $1.5 million. This requirement has been repealed effective July 1, 1989. There is no requirement for state review of TA applications.

EXECUTIVE ORDER 12372

DNRC will send all TA and ECM applications recommended to DOE for funding through the State Areawide Clearinghouse. The clearinghouse provides local governments, other state agencies, and applicable associations with an opportunity to review applications. The clearinghouse sends comments to DNRC.

DUE DATES FOR GRANT APPLICATIONS

The grant applications for each funding cycle are due at DNRC's Energy Division by the date established annually by DNRC. DNRC staff members review the applications and rank them; they then send their recommendations and the applications to DOE. DNRC will notify each institution of its recommendations to DOE. DOE reviews the applications and DNRC's recommendations and issues notifications of financial assistance awards. Each institution will be notified of its final grant application status after the awards have been made.

III. AUDITS AND TAs DONE OUTSIDE THE PROGRAM

ENERGY AUDITS

If an institution has had an energy audit conducted by a registered architect or engineer or someone certified by DNRC to do ICP audits without federal assistance and state guidance that institution may use the audit to apply for a TA grant. To use the audit the institution must transfer the energy audit information to the Montana ICP Energy Audit Workbook. If all the necessary energy audit data have not been gathered, the institution must gather whatever additional data are required to obtain DNRC's approval of the audit.

TECHNICAL ASSISTANCE REPORTS

The technical assistance report must be done by a certified ICP technical assistance analyst. (See page 13 for more information on analyst qualifications.) An institution may complete a technical assistance report without federal funding; however, the report must meet all federal and DNRC requirements. Completing a TA report at its own expense allows an institution to both complete a TA and apply for energy conservation measure funds in a single year. When a school or hospital pays for its own TA report, fifty percent of the costs may be counted as part of the institution's share of required ECM matching funds should the institution receive an ECM grant. The TA report must be completed by professionals who meet DNRC and federal guidelines. If an institution pays for its own TA report, there's no need to complete an energy audit workbook. TA reports must be submitted to DNRC for review on or before the date applications for ECM's are due.

Updating TA Reports

If a certified ICP technical assistance analyst finds that some cost-effective ECMs were not considered and included in a completed technical assistance report or if the original data has become obsolete due to technological change or cost fluctuations, an institution may update the report to support additional ECMs. However, DOE will not share in the cost nor allow credit for any additional TA work.

Energy savings interactions must be calculated for all ECM's from the update and from the original TA where appropriate.

The update must contain more than a single ECM unless the analyst can demonstrate to the satisfaction of DNRC that there are no other practical measures that should be considered in the update.

IV. GUIDELINES TO BE FOLLOWED DURING GRANT PERIOD

GRANT GUIDELINES

Each grantee receives grant guidelines with their Notice of Federal Financial Assistance. The guidelines outlined below represent typical examples of the key information provided to grantees. Grantees are encouraged to review their information carefully and completely.

The following guidelines apply to grants under this program:

- Obtaining professional architectural or engineering contracts for TA reports or for ECM design work must follow applicable DOE and Office of Management and Budget (OMB) requirements and should be signed within 90 days of grant notification.
- ECM applicants must submit final project design plans to the applicable local or state agency to assure that the designs conform to the applicable building code, and approval of design should be received from that agency before starting an ECM project.
- Procurement for A & E ECM design services and construction bidding procedures for ECM construction should encourage open and free competition and include Davis Bacon Act requirements.
- Construction contracts for ECM work should be signed within 120 days after the design work is completed.
- All ECM grants should be completed within the dates stated in DOE's Notice of Financial Assistance Award or DNRC'S written agreement. If an institution is unable to complete the work during the time specified, the institution must give DNRC written justification for changing the schedule. The request must be submitted to DNRC 30 days prior to the project's specified completion date. DNRC will act on the request for those grants funded with oil overcharge funds and will forward its recommendation on the requests to DOE for grants funded with DOE money. Extensions will be provided by DOE or DNRC in

writing and will allow no more than 18 additional months for project completion. Some work on the project, such as designing the ECMs, must have been started within the grant period for an extension to be granted.

REPORTS TO BE SUBMITTED TO DNRC

Semi-annual Reports

Each ECM grant recipient will submit progress reports to DNRC's Energy Division twice a year--on January 31 and on July 31--until the grantee's project is concluded. Each report will discuss milestones accomplished, those not accomplished, status of in-progress activities, problems encountered, and remedial actions planned. Grantees must also include a copy of the Federal Financial Status Report (SF-269). Report forms are available from DNRC. If the project is completed, a final report may be submitted instead of a semi-annual report.

Final Reports

TA and ECM grant recipients will send DNRC a completed Technical Assistance/Energy Conservation Measures Grant Final Report Form, two copies of the completed TA report, and a Financial Status Report (SF-269) within 90 days following completion of the project. The report forms are available from DNRC. A separate final report should be completed for each building. ECM grantees must also submit annual energy use reports for a three year period after project completion.

CHANGES IN APPROVED GRANTS

Changes in the Scope of Work Authorized For a Grant

A change in the scope of work for an approved grant is necessary when:

- Fund transfers between ECMs are proposed.
- Additional ECM work is proposed as a result of a cost underrun.
- A proposal is made to delete part of an ECM because of a cost overrun or other circumstances which were unforseen at the time the TA report was conducted. DOE funding will be reduced if the ECM is reduced.

- The final ECM design requires a change in the scope of work identified in the TA report.

Requests for changes will be sent to DNRC. DNRC will act on the request for those grants funded with oil overcharge funds and will forward the requests to DOE for grants funded with DOE money. The request for a change in the scope of work must include a letter stating the proposed changes, the reasons for the changes, and documentation from a certified technical analyst including revised estimates of both cost and Btu savings, implementation cost, and resulting payback. Upon approval, DNRC will provide written authorization for the change. Approval for the change in scope must be received by the grantee before any work included in the change is started.

V. METHODS FOR ESTABLISHING AN EQUITABLE ALLOCATION SYSTEM

SEVERE HARDSHIP FUNDING

The state may use up to 10 percent of its total allocation each cycle for hardship grants. An institution may be eligible for as much as 90 percent federal or oil overcharge funding (50 percent regular and 40 percent hardship). To apply for hardship funding, an institution must first request an eligibility determination from DNRC. DNRC will determine the amount of hardship funding the applicant is eligible to receive based on the unemployment rate in the applicant's county and the impact number formula.

Hardship applications will be ranked along with and in the same manner as other applications. Because hardship funding requests are provided only to those institutions that have no other means to fund a project, an applicant requesting hardship funding will receive either the full amount requested or nothing. If an applicant is denied hardship funding, the application will not be eligible for funding. Hardship funds which have not been applied for or remain after DNRC has completed its recommendations for hardship funding may be used to fund additional and eligible non-hardship applicants at the 50 percent funding level.

Universities and other state institutions are not eligible for hardship funding.

Unemployment Criteria

The unemployment rate in the institution's county for the previous calendar year will be used as a basis for awarding hardship points. Points will be assigned based on how much higher the applicant's county unemployment rate is than the statewide unemployment rate. If the county unemployment rate is 25% or greater above the state wide unemployment rate, points will be awarded as indicated in Table 1, Appendix C.

Impact Number Formula

The impact of energy costs shall be calculated for every eligible institution by dividing the total energy cost for the previous fiscal year in dollars by the total non-capitalized budget for the previous fiscal year in dollars. Schools or hospitals applying for hardship classification will be asked to provide all the data needed to calculate the formula. If the impact number is greater than 3%,points will be awarded as indicated in Table 2, Appendix C.

ALLOCATION OF FUNDS WITHIN A GROUP

At least 30 percent of the money available for TA and ECM grants will be awarded to schools and 30 percent to hospitals. If the application deadline passes and the applications from one group are not sufficient to use all the money, applications from the other group may be funded.

SEPARATING INSTITUTIONS INTO GROUPS

Institutions eligible for funds are divided into two groups, schools and hospitals.

FUNDING LIMITATIONS

No single institution's ECM grant application will be recommended for more than 25 percent of the total funds available for ECM grants in the program cycle, unless funds are available after all other projects are funded. In that case, money requested by the institutions will be awarded in the order of the initial ranking until funds are exhausted. Some ECM grants will be made for less than the requested amount to meet this limitation. (See also Allocation of Funds Within a Group, above)

SPECIFIC ALLOCATION METHODS

Splitting Funds Between TAs and ECMs

Funding will be split between TAs and ECMs. If the TA allocation is not exhausted by eligible applicants, the remaining allocation may be used to fund ECMs. Fifteen percent of DNRC's total money available in each grant cycle will be available for TAs.

RANKING CRITERIA BY GRANT CATEGORY

Technical Assistance

Ranking of TA applications will be based on Btu per square foot per year per degree day data provided in the energy audit. Buildings with the highest demonstrated rate of energy consumption will be ranked first. Top ranked applications will be funded.

Energy Conservation Measures

Ranking of ECM applications will be based on a weighted point system incorporating the following criteria in descending order as established by DOE in 10 CFR Part 455.71:

a. Average payback.
b. Conversion to renewable energy source.
c. Conversion to coal or cogeneration.
d. Type and quantity of fuel saved.
e. Quality of TA report.
f. First application for this building.

VI. RANKING PROCEDURES TO BE USED

AN OVERVIEW OF THE RANKING PROCEDURES

Applications for grants must be prepared by the applicants or their authorized representatives and received by DNRC on or before the deadline established for each grant cycle. DNRC's Energy Division will review each application to determine eligibility. If an application is not acceptable, it will be returned to the applicant with a letter outlining the reasons for its return. DNRC staff members will work with applicants to correct minor application errors within the current grant cycle; but if an application needs extensive reworking, the institution may be asked to resubmit the application in the next grant cycle.

All applications will be ranked and funded measure by measure in the appropriate group as outlined in the Appendix B. The total points scored by the applicants will be ranked in each group. DNRC will then specify a recommended amount of funding for each applicant. Applicants will be notified by DNRC of how their applications ranked and how much funding DNRC will recommend.

Successful grant applicants must submit written certification that sufficient non-federal matching funds will be available without further authorization by the institutions.

When all reviews, rankings and certifications are completed, DNRC will submit to DOE a list of applications ranked with the recommended amounts of funding, the recommended source of funding (oil overcharge or DOE), and other necessary information. DNRC shall also submit alternative projects which may be funded should any of the recommended projects be rejected by DOE or withdrawn by the applicant.

VII. INTERNAL CONTROL PROCEDURES

PROCEDURES FOR DNRC MANAGEMENT AND PROJECT MONITORING OF GRANTS

General Oversight

DNRC will be responsible for overall program management and will provide general program policy while following the federal rules and regulations (see Appendix E).

DNRC will establish a centrally located energy data base, prepare public notices and news releases, develop a comprehensive reporting mechanism, and provide grant management assistance.

DNRC will review TA and ECM spending documents to ensure: that each agrees with application budget documents submitted to and approved by DOE; that proposed and approved project activities are proceeding in accordance with proposed milestone periods; that all operations and maintenance procedures have been implemented (unless an exception is granted); and that all assurances and certifications have been met, including OMB A-102 or A-110 requirements.

A DNRC representative will visit at least 10 percent of the TA and ECM grantees to ensure compliance with federal and DNRC requirements. DNRC will monitor operations and maintenance recommendations from the energy audits and technical assistance reports. Institutions will be requested to implement any additional O&M's identified by DNRC. Each PVE grantee will be site monitored at least once during their grant. The monitoring checklist is attached to this plan as Appendix G.

DNRC also will determine how effectively the total grants program and each TA and ECM grant has reduced energy consumption. Information from progress and final reports will form the basis for DNRC's evaluation. Energy savings will be calculated in Btu per gross square feet.

DNRC Reports for Oversight Activities

DNRC's record-keeping and quarterly reports will be submitted to DOE in accordance with CFR 455.63 (see Appendix F). DNRC shall submit quarterly Financial Status Reports (SF-269) on program-related spending. The reports will be sent to DOE within 30 days after the end of each quarter.

In addition to SF-269, narrative program reports submitted in February and August will include:

- A narrative of DNRC's administrative activities
- A summary of the most recent narrative reports DNRC has received from grantees.
- Such other information as DOE may from time to time request.

DNRC's August report will also include an estimate for each type of energy annual energy-use reductions in the state attributable to implementation of operations and maintenance procedures and installation of energy conservation measures under this program. Such estimates shall be based upon a survey of institutions participating in this program and on the grantee's reports submitted to DNRC.

ASSURING THE COMPLIANCE OF GRANT EXPENDITURES

Before an institution receives funds for a TA or ECM, it must give written assurance in its application that the grant will be spent in compliance with the state plan and federal regulations (see Appendix E) and in cooperation with other state and federal energy conservation programs.

When an official of an institution signs an application, that institution assures that it will comply with DNRC and federal policies.

The applicant will certify compliance with all applicable federal regulations, policies, guidelines, and requirements.

FEDERAL ASSISTANCE WILL NOT REPLACE LOCAL FUNDS

Financial assistance for the grants program will be used to supplement, and not replace, state, local or other funds. Procedures are necessary to ensure that federal assistance for both TAs and ECMs is used to aid institutions in programs that they might otherwise not be able to undertake. Federal assistance is not to subsidize programs that institutions are already able to finance with money from local, state or other sources. An institution must not use cash contributions from other federal sources to match the federal money allocated by this grants program, unless it provides written authorization from the other federal agency authorizing it to use its money in this program. This includes personnel hired with money from other federal programs. Money received by hospitals through Medicare and Medicaid is not considered money from a federal source since it is reimbursement for costs already incurred by the hospital.

VIII. STATE STANDARDS AND POLICIES

TECHNICAL REVIEW

TAs will be reviewed and approved by a DNRC-appointed engineer and ICP staff members. Institutions that submit TAs which are reviewed and determined not to meet minimum requirements will be allowed a reasonable time for their TA analyst to submit necessary revisions. A letter will be mailed to the analyst and a copy to the institution describing the TA deficiencies and identifying a deadline for resubmittal. The institution will be allowed two revisions to bring the TA up to minimum requirements. In addition, DNRC will implement the following policies regarding TA approval:

- DNRC has no required list of software programs although some programs have been accepted in past approved reports. A program that has not been accepted in prior approved reports should be submitted with documentation for DNRC review. Each software program used must be used appropriately and stand on its own merit by providing the required information. A software program that cannot adequately provide the information required for the TA minimum requirements will be accepted only if further manual adjustments are made and clear documentation and narrative are provided to explain the further adjustments. Software programs which do not use an acceptable methodology will not be approved.

- Changes made to the thermal model base case must be explained and documented with computer input summaries. The summaries must be labeled clearly, and changes must be described. The base case model must be compared to actual consumption patterns. Discrepancies between modeled and actual energy useage must be explained.
- Computer output printouts must be submitted with the TA as an appendix to support a computer summary information page in the TA. The computer output should be labeled clearly.
- The TA analyst may be asked to resubmit a final TA report incorporating all the revisions requested by the DNRC reviewers into the body of the report, rather than attaching the revisions as addendums or separate letters. As a service, DNRC will review a draft for an analyst before the TA report is finalized.
- Heating or cooling degree day methods will be accepted as verification of computer output only. These calculations must include a correction factor, Cd, for internal and solar gains. ASHRAE 1985 Fundamentals Handbook Section 28 must be used, unless the Cd from ASHRAE is considered inapplicable, in which case the analyst should develop and document a correction factor by some other method as approved by DNRC.

TECHNICAL ASSISTANCE ANALYST REQUIREMENTS

To become a certified ICP technical assistance analyst in Montana, a person must meet the following requirements:

1. Be a registered professional engineer licensed in Montana, and have a minimum of two years experience in building energy systems and energy conservation; or be a member of an architect and engineer team in which the principal team members are registered professionals, licensed in Montana. Each principal team member must have a minimum of two years experience in building energy

systems and energy conservation; and

2. Attend an Institutional Conservation Program-sponsored Technical Assistance Workshop before beginning any TA Project. The analyst must attend a workshop at least every other year or must submit at least two acceptable TA reports in each two-year period.

3. Certify that they have no conflicting financial interests in their recommendations.

DNRC will maintain a list of analysts who meet the above requirements. Anyone may receive the list on request. Certification by DNRC does not necessarily enhance the design professional's qualifications. Grantees are encouraged to conduct sufficient research and interviews before entering into a formal agreement.

TA analysts who have had more than one TA disapproved in two consecutive cycles by failing to respond to comments within the specified timeframe or by failing to correct the deficiencies noted by the ICP reviewer, will be removed from the list of certified analysts until they are recertified by attending another TA workshop and submitting an approved TA report.

ENCOURAGING USE OF SOLAR AND OTHER RENEWABLE RESOURCES

DNRC encourages the use of solar and other renewable resources. While renewable energy is vital in energy conservation the practical application of renewables under this program has been very limited. The evaluation and ranking of applications for ECM funding will include points for conversion to renewable resources.

TECHNICAL ASSISTANCE REPORTS SUMMARY

An informal analysis of five technical assistance reports from 1987-1988 for two college buildings, one elementary school, one hospital, and one elementary/high school combination shows:

1. TA costs from 4.6¢/square foot for the MSU Fieldhouse to 17¢ for the Marcus Daly Hospital with the average cost at 10.2¢. Total TA costs ranged from $2,200 to $8,800 with an average cost of $5,919.

2. Twenty-one ECMs were recommended with paybacks from 2-10 years with an average cost of $22,228. ECM costs ranged from $210. for lighting sensors at the ST. Labre School to $196,000 for heating/ventilating revisions at the MSU Fieldhouse. The total ECM costs per building

ranged from $31,500 to $280,595 with an average of $91,695.

3. The estimated dollar savings average per ECM is $3,800 per year with the BTU savings averaging 776.3×10^6 BTU/year.

4. O & M savings estimates range from none to 833.6×10^6 BTU/year/building.

The types of ECMs that are appropriate for analysis in Montana are:

1. Converting to Coal or Wood Heating Systems
2. Constructing Vestibules
3. Blocking or Replacing Windows
4. Insulating Walls and Ceilings
5. Retrofitting and Removing Lights
6. Installing Energy Management Systems
7. Retrofitting and Replacing Boilers
8. Installing and Modifying Heating System and Domestic Hot Water Controls
9. Heating, Ventilating, and Exhaust System Modifications

FUEL CONVERSION FACTORS

DNRC has determined that the following Btu conversion factors will be used to compute energy usage and savings calculations for technical assistance reports.

Energy Source	Quantity	Unit
Electricity	3413 Btu[A]	kwh
	11600 Btu[B]	kwh
Natural Gas	**	
Fuel Oil #2	138,690 Btu	gal
Fuel Oil #6	149,690 Btu	gal
Coal	8.5 mm Btu	short ton ***
LPG	95,475 Btu	gal
Saturated Steam	960 Btu	lb.
Super Heating System	****	lb.

[A] Institutional (site) Conversion Factor: To be used for all electrical saving ECM's.

[B] Point of Generation Conversion Factor: Applicants for cogeneration projects may use a kwh to Btu conversion factor of 11,600 Btu/kwh in computing the energy savings of the proposed unit.

**Use the conversion factor supplied by the utility that supplies natural gas to the particular building. If the local utility is unable to supply a figure, contact DNRC.

*** This is an average for Montana Coal. The analyst must determine where the coal will be purchased and what the actual Btu value is in order to size the boiler.

**** Use Steam Tables

CALCULATING ELECTRICAL ECM SAVINGS INCLUDING DEMAND SAVINGS

A blended rate, which includes kwh plus demand charges, shall be used to determine cost savings for all electricity-saving ECMs, regardless of whether a particular ECM truly saves demand or not. A methodology other than the following method determining a blended rate may be used if acceptable justification is provided for the alternative method. To determine the blended rate:

1. Calculate total kwh consumed for the last 12 months.
2. Multiply total in #1 by the most current average in the past year, kwh rate using the applicable seasonal and incremental rates to determine average kh rate.
3. Calculate total kw demand charged for the last 12 months.
4. Multiply total in #3 by the most current demand rate using the applicable seasonal rates to determine average demand rate.
5. Add the products of #2 and #4 together.
6. Divide the sum in #5 by the total kwh consumption from #1.

Example: Assume an institution consumed 100,000 kw and 1,000 kw billed demand over the last 12 months. The current average kwh rate is 3 cents per kwh and the current average demand rate is $2.00/kw. Following the formula above:

- 100,000 kwh/yr.
- 100,000 kwh x 3 cents/kwh = $3,000.
- 1,000 kw billed demand/yr.
- 1,000 kw x $2.00/kw = $2,000.
- $3,000 + $2,000 = $5,000.
- $5,000/100,000 kwh = 5 cents/kwh.

In the above example, kwh savings will be multiplied by the blended rate of 5 cents/kwh, not 3 cents/kwh, to determine kwh cost savings for all electrical ECMs.

CALCULATION OF COSTS FOR ECMS

All costs for ECM labor must be calculated at the applicable federal Davis-Bacon rate. Material costs must be calculated at the rate a local supplier charges or from a recognized publication that specifies building material costs.

APPENDIX A

RANKING OF TECHNICAL ASSISTANCE PROGRAM APPLICATIONS

APPENDIX A

RANKING OF TECHNICAL ASSISTANCE PROGRAM APPLICATIONS

Each application for assistance will be ranked based upon data provided in the application as follows:

$$\text{TA Ranking Number} = \frac{\text{Energy Use Index}}{\text{Heating Degree Days Per Year}}$$

(0.1 added if the building's energy audit was conducted without federal funds)

Where:

Energy Use Index = The total energy consumption of the building for the calendar year immediately preceding the date of application, minus the estimated Btu savings after implementing operation and maintenance changes identified in the energy audit, expressed in Btus, divided by the total square feet in the building(s).

Heating Degree Days Per Year = The Sum of Daily Degree Days for the Year

Daily Degree Days =

$$65 \text{ degrees} - \frac{\text{high daily temp} + \text{low daily temp}}{2} \times 365$$

(Heating degree days may be obtained by calling the closest federal weather station.)

Note: The ranking procedures described above will be performed in a given grant cycle only if the total amount requested by schools and hospitals for technical assistance reports and ECMs is more than the funds available for such grants.

APPENDIX B

RANKING OF ENERGY CONSERVATION MEASURES APPLICATIONS

APPENDIX B

RANKING OF ENERGY CONSERVATION MEASURES APPLICATIONS

Each energy conservation measure will be assigned a ranking number for funding purposes based upon the data provided in the application and approved technical assistance report. The ranking criteria for funding of energy conservation measures is based on a weighted point system incorporating the following criteria in descending order as established by the U.S. Department of Energy in 10 CFR Part 455.71.

55.5%	Average payback
16.6%	Conversion to renewable energy source
11.1%	Conversion to coal or cogeneration
9.3%	Type and quantity of fuel saved
4.6%	Quality of TA Report
2.7%	First application for building

Weighing percentages are based on maximum allowable points in each category.

Ranking points established for each energy conservation measure in each funding cycle will be ranked with other applicants and listed in declining order. Funding will begin with the largest ranking number and continue down the list until all funds in a given cycle are exhausted. Recommendations for funding of each applicant will be made according to procedures described in Chapter VI "Ranking Procedures To Be Used".

APPENDIX B
CONTINUED

ECM - BY - ECM RANKING FORM

INSTITUTION:________________ BUILDING NAME:________________

A: PAYBACK=				
Total cost of the proposed ECM divided by the total value of projected interactive savings of the proposed ECM (See page 23)	=_______YRS.	score factor from Table 1 ________	X 60	SCORE =_______
B: FUEL CONVERSION=				
The % of buildings current energy consumption in BTUs replaced through conversion to renewables, coal or cogeneration	IF 15% & over	1.0	X 18 for conversion to renewable	=_______
	IF 10% - 14%	.9		
	IF 5% - 9%	.8	X 12 for conversion to coal or cogeneration	=_______
	IF 1% - 4%	.7		
C: SAVING BY FUEL TYPE=	(50% maximum)			
The percentage of bldgs current energy consumption in BTUs by fuel type saved by installation of the ECM. (increased consumption of any fuel type, (except renewables), will be entered as negative savings)	OIL	____%	X .20	=_______
	ELECTRICITY	____%	X .18	=_______
	NAT GAS & LPG	____%	X .16	=_______
	COAL / OTHER	____%	X .14	=_______
D: TA QUALITY=				
From TA Quality form page 24 in ICP State Plan	0 - 5 points possible			=_______
E: FIRST ECM APPLICATION FOR BUILDING				
NO	add 0 points			
YES	add 3 points			=_______

TOTAL ECM RANKING SCORE = ________

APPENDIX B
CONTINUED

Score Factors for Payback Criterion

Table 1

Payback in Years	.0	.1 (yr)	.2	.3	.4	.5 (1/2 yr)	.6	.7	.8	.9
2	1.00	.99	.98	.97	.96	.95	.94	.93	.92	.91
3	.90	.89	.88	.87	.86	.85	.84	.83	.82	.81
4	.80	.79	.78	.77	.76	.75	.74	.73	.72	.71
5	.70	.69	.68	.67	.66	.65	.64	.63	.62	.61
6	.60	.59	.58	.57	.56	.55	.54	.53	.52	.51
7	.50	.49	.48	.47	.46	.45	.44	.43	.42	.41
8	.40	.39	.38	.37	.36	.35	.34	.33	.32	.31
9	.30	.29	.28	.27	.26	.25	.24	.23	.22	.21

* Special procedures for calculating "Payback"

1. For energy conservation measures which result in conversion from natural gas, petroleum products, or electricity to coal, the simple payback period shall be calculated based on the net annual fuel cost savings (using current energy prices) associated with the change in fuels.

2. For solar or other renewable resource energy conservation measures, the simple payback period shall be calculated using the amount of the funds that would have been used for energy costs (using current energy prices) minus the cost (if any) of the renewable fuel or resource.

TA Quality Rating Form

The "Quality" of the TA report and the update report will be judged by the DNRC Review Engineer on reports that have been approved to meet the minimum requirements. 0 - 5 points will be assigned for the "quality" of the TA report and this number will be placed in Part D of the ranking sheet for ECM grant applications. The points assigned for quality will be determined by 1) the report's need for revisions and 2) the quality rating as poor, standard, or outstanding based on the reports's clarity, completeness, and reliability. A list of criteria will be used by the reviewer to decide on this rating. Quality rating points will be assigned according to the following procedure:

1. Compliance with minimum TA requirements, 10 CFR Part 455.42.

No or only minor details and/or revisions will have to be obtained from the analyst	1-2 pts
Major revisions will have to be obtained	0 pts

2. Clarity, completeness, and reliability of information in the Final TA Report:

Outstanding quality - a TA report in compliance with 10 CFR Part 455.42 and where DNRC review engineers rated work quality within the range (See Rating form).	3 pts
Standard quality - a TA report in compliance with 10 CFR Part 455.42 and where DNRC review engineers rated work quality within the range (See Rating form).	2 pts
Poor quality - a TA report in compliance with 10 CFR Part 455.42 and where DNRC review engineers rated work quality within the range (See Rating form).	0 pts

TOTAL QUALITY RANKING POINTS ________

APPENDIX B
CONTINUED

TA Quality Rating Form
Completed by DNRC Reviewing Engineer

1. The report is useful and clear to the institution as a guide for present and future energy conservation planning.

   a. The report is well organized including:
      pages numbered, table of contents and
      executive summary. 0-5 pts

   b. The report provides a clear description of the building and energy systems including:
      Site plans, photos, drawings,
      Energy data clearly presented and
      Lighting and equipment tables
      that provide KW ratings and
      usage factors. 0-6 pts

   c. The description of the operation and maintenance changes, and the energy conservation measures were written with the institution's administration and maintenance staff as the targeted audience including:
      Technical terminology is explained,
      Variables used in equations are explained,
      Labor cost estimates are described by
       type, hours, and $/hr,
      Material costs estimates are described
       by major components. 1-10 pts

   d. The value of a good operation and maintenance program is explained and continued efforts in this area are encouraged. 0-5 pts

2. Investigations of all reasonable ECM's for the building were completed and reported in the TA.

   a. At least one ECM was developed in the following areas or the lack of ECMs in any one area was adequately explained: heating ventilating, air conditioning systems, building envelope, lighting systems, domestic hot water, and renewables.
      yes 10 pts
      no 0 pts

   b. More than 5 ECM's were developed (including those not eligible for funding).
      yes 5 pts,

no 0 pts.

3. Calculation methodologies were used to determine the most reliable payback estimates for ECM's.

    a. Cost estimates were well documented with the source of information, date of estimates, and explanation of any estimates that were outside typical costs for similar ECM's. 0-5 pts.

    b. Energy savings estimates were determined using an appropriately detailed simulation model or calculation methodology in analyzing base load, and projected savings. This includes analysis on thermal, lighting, equipment, DHW, AC, and special energy loads.

Minimally acceptable analysis	0 pts
Appropriately detailed analysis	10 pts
Most detailed analysis for this building	15 pts.

    c. Energy costs per MMBtu as determined by utility or supplier's fuel value (documented) and specific for the building. yes 5 pt
    no 0 pts

4. Other optional features were included in the analysis and/or report that enhances the TA's usefulness, clarity, and reliability. Reviewers Specify. 0-10pts.
(Examples of such features would be:
    Report included IES recommended illumination tables
    Analysis of more than 2 years of historical energy data
    Additional equipment performance and operational information.)

TOTAL RATING POINTS __________

TA REPORT RATING
0-25 pts = poor quality rating (add 0 pts to ranking)
26-50 pts = standard quality rating (add 2 pt to ranking)
51-75 pts = outstanding quality rating (add 3 pts to ranking)

UPDATE RATING
Rate Update reports on #1c and 3a, b, c only.
0-10 pts = poor quality rating (add 0 pts to ranking)
11-20 pts = standard quality rating (add 2 pt to ranking)
21-35 pts = outstanding quality rating (add 3 points to ranking)

APPENDIX C

RANKING OF SCHOOL AND HOSPITAL APPLICATIONS FOR SEVERE HARDSHIP

APPENDIX C

RANKING OF SCHOOL AND HOSPITAL APPLICATIONS FOR SEVERE HARDSHIP

UNEMPLOYMENT CRITERIA

For ranking of school and hospital applications for severe hardship. The unemployment rate of the previous calendar year for each applicant's county will be compared to the state average for the same period as determined by the Research and Analysis Bureau of the Montana Department of Labor and Industry.

If the annual county unemployment rate exceeds the state average by more than 25%, additional funding will be awarded by the corresponding percentage points determined in Table 1.

The maximum amount of additional funding available based on unemployment criteria is 20%.

RANKING OF SCHOOL AND HOSPITAL APPLICATIONS
FOR SEVERE HARDSHIP
TABLE 1

Percentage of County Unemployment Above State Average Unemployment Rate	Points
25.0 - 28.8	1
28.9 - 32.7	2
32.8 - 36.6	3
36.7 - 40.5	4
40.6 - 44.4	5
44.5 - 48.3	6
48.4 - 52.2	7
52.3 - 56.1	8
56.2 - 60.0	9
60.1 - 63.9	10
64.0 - 67.8	11
67.9 - 71.7	12
71.8 - 75.6	13
75.7 - 79.5	14
79.6 - 83.4	15
83.5 - 87.3	16
87.4 - 91.2	17
91.3 - 95.1	18
95.2 - 99.9	19
100 and above	20

APPENDIX C
CONTINUED

IMPACT NUMBER FORMULA

Additional energy impact funding awarded is based on the percentage of an institution's total noncapitalized budget that is spent paying utility costs. Amounts of actual energy expenditures and total budget for the previous fiscal year will be used in the impact number formula to determine an impact number.

Additional funding will be awarded by the corresponding percentage points determined in Table 2.

The maximum amount of additional funding available based on impact of energy costs is 20%.

TABLE 2

Impact Number	Points
.000 - 030	0
.031	1
.032	2
.033	3
.034	4
.035	5
.036	6
.037	7
.038	8
.039	9
.040	10
.041	11
.042	12
.043	13
.044	14
.045	15
.046	16
.047	17
.048	18
.049	19
.050 and above	20

APPENDIX D

PRELIMINARY ENERGY AUDIT DATA

APPENDIX D

PRELIMINARY ENERGY AUDIT (PEA) DATA

Upon initiation of Phase I, Cycles 1 and 2, PEA questionnaires were sent to representative organizations and eligible institutions in Montana. Institutions were asked to voluntarily complete and return the questionnaires to the state. DNRC estimated 1813 buildings in the state were eligible for program assistance. As of December 1981, DNRC has PEA data collected for 779 buildings.

The PEA data base is enlarged when DNRC receives a completed energy audit (EA) workbook from an institution. DNRC's Energy Division personnel transfer the EA information onto PEA computer forms and enter the data into a computer. This allows DNRC to reduce errors made by institutions in overestimating such factors as building square footage, area of south facing walls and windows, insolation, and prorating of energy usage for unmetered buildings in a complex.

Certain retrofit efforts are common in Montana due to climate and geographic conditions. These include: blocking/insulating windows, adding insulation in wall, roof and floor areas, adding vestibules to exterior entrances, installing new efficient boilers or heat recovery devices, installing day/night thermostats and optimal-start devices on existing boilers. Some institutions have also converted their boilers to burn coal or wood fuel.

Several communities have opportunities for geothermal and wind power retrofits. Solar potential is greater east of the Continental Divide, and the use of biomass from forest products has a greater potential in the western area of the state.

The material contained in the following studies is the result of analysis of data received from participating institutions as of October 5, 1979. The analysis was divided into separate studies based on the types of institutions that have been eligible for this program.

The analysis examined variations in buildings on the basis of their Btu usage per square foot of the building area per degree day. This was done by breaking the Btu usages into ranges within which the data were to be examined. All facilities included in the study were split into four ranges of Btu usage. The Btu ranges chosen included the following:

A. Very efficient--less than 07 Btu/sq ft/DD
B. Efficient--07 to less than 20 Btu/sq ft/DD
C. Inefficient--20 to less than 50 Btu/sq ft/DD
D. Very inefficient--50 Btu/sq ft/DD or more

The ranges were chosen to include a reasonable representation within each institutional category so that a broad data base could be obtained.

While these studies can prove beneficial in overall analysis of energy usage in Montana, the evaluation format did contain certain limitations.

The information contained on these Data Study forms is only as reliable as the information provided by the institution (via PEA and EA forms). While the information is assumed to be reasonably accurate, DNRC cannot guarantee the accuracy of the responses obtained.

PEA Data Studies - Overview

A. Studies 1, 2, 3, 4 examine the specific institutional categories through examination of energy consumption. Pages 34-37.

B. Combined data study of 1, 2, 3, 4 totals all buildings through energy consumption characteristics. Page 38.

C. Data Study estimates Btu savings for operational and maintenance (O&M) changes. Page 39.

D. Studies 5, 6, 7, 8 examine the specific institution categories through examination of energy consumption patterns. Adjusted Btu usage is computed to take into consideration estimated O&M energy savings. Potential Btus saved for recommended ECMs are estimated by identifying common energy utilization characteristics and assigning a mean percentage level of Btu savings realizable. Pages 41-44.

E. Studies 5, 6, 7, and 8 combined, total the energy consumption characteristics of all buildings. Page 45. In each energy use range, a total of estimated Btu savings is given:

1. per energy consumption level characteristic
2. for the total Btu saved by building category under the grant.

F. The energy conservation measures (ECMs) that have been used in studies 5, 6, 7, and 8 to establish potential Btu savings from ECMs have not been analyzed to show the cost of implementation because of the diversified nature of the potential ECMs.

G. The Solar Potential Data lists the number of buildings by category with completed PEAs that might be able to use solar equipment. Page 46.

H. PEA data information listing the energy conservation measures that institutions report they have installed. Page 47.

DATA STUDY #1 - SCHOOL BUILDINGS

Buildings included in this study are divided into the following categories:

A. Very efficient--less than 07 Btu/sq ft/DD
B. Efficient--07 to less than 20 Btu/sq ft/DD
C. Inefficient--20 to less than 50 Btu/sq ft/DD
D. Very inefficient--50 Btu/sq ft/DD
E. Total each category

I. General Information	A	B	C	D	E
1. Number of Buildings in Category	19	89	34	35	177
2. Total Sq. Footage in Category	578,649	4,379,991	1,049,594	1,676,364	7,684,598
3. Total Btu Usage (all buildings) ($x10^9$)	20.9165	545.3524	223.7266	2805.1088	3595.1043
4. Average Yearly Btu Usage/Bldg. ($x10^9$)	1.1009	6.1276	6.5802	80.1460	20.3113
5. Average Yearly Btu Usage/ft2/Bldg. ($x10^9$)	3.6147	12.4510	21.3155	167.3329	46.7832
II. Building Usage					
1. Elementary	4	42	13	29	88
2. Secondary	1	24	10	4	39
3. College or University	13	12	9	1	35
4. Vocational	1	5	1		7
5. Local Education Administrative		1	1	2	
6. Other		5	1		6

DATA STUDY #2 - HOSPITALS

Buildings included in this study are divided into the following categories:

A. Very efficient--less than 07 Btu/sq ft/DD
B. Efficient--07 to less than 20 Btu/sq ft/DD
C. Inefficient--20 to less than 50 Btu/sq ft/DD
D. Very inefficient--50 Btu/sq ft/DD
E. Total each category

I. General Information	A	B	C	D	E
1. Number of Buildings in Category		2	16	6	24
2. Total Sq. Footage in Category		90,305	1,266,283	384,191	1,740,779
3. Total Btu Usage (all buildings) (x109)		12.0397	374.6665	494.8678	881.5740
4. Average Yearly Btu Usage/Bldg. (x109)		6.0199	23.4167	82.4780	36.7323
5. Average Yearly Btu Usage/ft2/Bldg. (x10^4)	13.3323	29.5879	128.8078	50.6425	
II. Building Usage					
1. General			16	6	24

DATA STUDY #3 - PUBLIC CARE BUILDINGS

Buildings included in this study are divided into the following categories:

A. Very efficient--less than 07 Btu/sq ft/DD
B. Efficient--07 to less than 20 Btu/sq ft/DD
C. Inefficient--20 to less than 50 Btu/sq ft/DD
D. Very inefficient--50 Btu/sq ft/DD
E. Total each category

I. General Information	A	B	C	D	E
1. Number of Buildings in Category	1	1	7		8
2. Total Sq. Footage in Category	unknown	6,322	304,777		311,099
3. Total Btu Usage (all buildings) ($\times10^9$)	.4040	1.8744	84.6000		86.8517
4. Average Yearly Btu Usage/Bldg. ($\times10^9$)	.4040	1.8477	12.0857		9.6502
5. Average Yearly Btu Usage/ft2/Bldg. ($\times10^4$)	40400.000	29.2265	27.7580		27.9177
II. Building Usage					
1. Nursing Home			7		7
2. Long-term Care (other than nursing home)					
3. Rehabilitation Facility		1			1
4. Residential Child Care	1				1

DATA STUDY #4 - LOCAL GOVERNMENT BUILDINGS

Buildings included in this study are divided into the following categories:

A. Very efficient--less than 07 Btu/sq ft/DD
B. Efficient--07 to less than 20 Btu/sq ft/DD
C. Inefficient--20 to less than 50 Btu/sq ft/DD
D. Very inefficient--50 Btu/sq ft/DD
E. Total each category

I. General Information	A	B	C	D	E
1. Number of Buildings in Category	1	12	15	3	31
2. Total Sq. Footage in Category	5,300	596,907	314,933	54,000	971,140
3. Total Btu Usage (all buildings) $(x10^9)$	.1747	94.1032	80.5158	66.0239	240.8176
4. Average Yearly Btu Usage/Bldg. $(x10^9)$	.1747	7.8419	5.3677	22.0080	7.7683
5. Average Yearly Btu Usage/ft2/Bldg. $(x10^4)$	3.2962	15.7651	25.5660	122.2665	24.7974
II. Building Usage					
1. Offices		3	4	2	9
2. Storage	1				1
3. Service/Garage	2	6			8
4. Library	1	1			2
5. Police Station					
6. Fire Station		1			
7. Other	1	5	3	1	10

COMBINED TOTAL OF DATA STUDY #1, 2, 3, 4

PERCENT OF ESTIMATED BTU SAVINGS FOR O&M CHANGES

Buildings included in this study are divided into the following categories:

- A. Very efficient--less than 07 Btu/sq ft/DD
- B. Efficient--07 to less than 20 Btu/sq ft/DD
- C. Inefficient--20 to less than 50 Btu/sq ft/DD
- D. Very inefficient--50 Btu/sq ft/DD
- E. Total each category

I. General Information	A	B	C	D	E
1. Number of Buildings in Category	21	104	72	44	241
2. Total Sq. Footage in Category	583,949	5,073,525	2,935,587	2,114,555	10,707,616
3. Total Btu Usage (all buildings) ($x10^9$)	21.4952	653.3430	763.5098	3366.0005	4804.3476
4. Average Yearly Btu Usage/Bldg. ($x10^9$)	1.0236	6.2821	10.6043	76.5000	19.9351
5. Average Yearly Btu Usage/ft2/Bldg. ($x10^4$)	3.6810	12.8775	26.0087	159.1825	44.8685

II. Estimated Btu Savings for O&M Changes x 10^9	A(.05%)	B(.10%)	C(.25%)	D(.40%)	E
1. Schools -- Est. Savings for Category	1.046	54.535	55.932	1122.044	1233.557
2. Hospitals -- Est. Savings for Category	0	1.204	93.666	197.947	292.817
3. Public Care -- Est. Savings for Category	unknown	.185	21.150	0	21.335
4. Local Government -- Est. Savings for Category	.0087	9.410	20.129	26.401	55.949
Total Btu Saved in Category Column x 10^9	1.055	65.334	190.877	1346.392	
Grand Total Btu Saved all Categories x 10^9					1603.658

PEA DATA STUDY

ESTIMATED BTU SAVINGS FOR OPERATIONAL AND MAINTENANCE CHANGES (O&M)*

Buildings included in this study are divided into the following categories:

A. Very efficient--less than 07 Btu/sq ft/DD
B. Efficient--07 to less than 20 Btu/sq ft/DD
C. Inefficient--20 to less than 50 Btu/sq ft/DD
D. Very inefficient--50 Btu/sq ft/DD
E. Total each category

I. General Information	A	B	C	D	E
1. Number of Buildings in Category	21	104	72	44	241
2. Total Sq. Footage in Category	583,949	5,073,525	2,935,587	2,114,555	10,707,616
3. Total Btu Usage (all buildings) ($x10^9$)	21.4952	653.3430	763.5089	3366.0005	4804.3476
4. Estimated percentage of savings attributed to O&M changes (%)	.05	.10	.24	.40	
5. Estimated Btu Savings for O&M changes ($x10^9$)	1.055	65.334	190.877	1346.392	1603.658*
6. Adjusted Btu Usage After Estimated O&M changes ($x10^9$)	20.4492	588.009	707.5769	2243.9565	3200.6896
II. Percentage of the Estimated Savings of the Total Btu Savings					
1. Schools	.06	3	3	70	76.06
2. Hospitals	0	.08	6	12	18.08
3. Public Care	unknown	.01	.1	0	.11
4. Local Government	.0005	.5	1	2	3.5005
5. % in each Btu Category	.0605	3.59	10.1	84	97.8

III. Distribution Problem

1. Eighty-four percent of the potential energy savings is derived from 18 percent of the buildings (Column D).
2. Forty-eight percent of the least efficient buildings (total buildings in Columns C & D) have potential energy savings through O&M changes that amount to 94 percent of the potential savings of all the categories.
3. Percentage distribution and the estimated Btu saved can be radically affected by assigning a greater percentage of savings potentials per category than the values assigned in this study.

DATA STUDY #5 - SCHOOL BUILDINGS

Estimated Btu Saved by Potential ECMs Recommended*

Buildings included in this study are divided into the following categories:

A. Very efficient--less than 07 Btu/sq ft/DD
B. Efficient--07 to less than 20 Btu/sq ft/DD
C. Inefficient--20 to less than 50 Btu/sq ft/DD
D. Very inefficient--50 Btu/sq ft/DD
E. Total of Categories

I. General Information	A	B	C	D	E
1. Number of Buildings in Category	19	89	34	35	177
2. Total Sq. Footage in Category	578,649	4,379,991	1,049,594	1,676,364	7,684,598
3. Total Btu Usage (all buildings) ($x10^9$)	20.9165	545.3524	223.7266	2805.1088	3595.1043
4. Adjusted Btu Usage after estimated O&M Changes ($x10^9$)	19.8705	490.8174	167.7946	1683.0648	2361.5473
5. Estimated Savings for ECM Changes in Percentage if implemented	.22	.22	.22	.22	.22
6. Estimated Btu Savings for ECM ($x10^9$)	4.37	107.99	36.91	370.27	*519.54

II. Methodology for Estimating ECM Savings

Refer to Volume I -- Making Cents of Your Energy Dollar, page 7.

Percentage of Energy Utilization Total		Possible Percentage of Savings	Mean	Percentage of Total Based on Mean
HVAC	65	0 - 90	30	19.50
Lighting General Electrical	15	2 - 40	10	1.50
Special	10	0 - 100	0*	0
Food Services	7	2 - 20	10	.7
Hot Water	3	20 - 60	25	.75
Total				22

*Special Services--Least likely to have a reduction due to needs of special education.

DATA STUDY #6 - HOSPITALS

Potential Btu Saved for Potential ECMs Recommended*

Buildings included in this study are divided into the following categories:

- A. Very efficient--less than 07 Btu/sq ft/DD
- B. Efficient--07 to less than 20 Btu/sq ft/DD
- C. Inefficient--20 to less than 50 Btu/sq ft/DD
- D. Very inefficient--50 Btu/sq ft/DD

I. General Information	A	B	C	D	E
1. Number of Buildings in Category	0	2	16	6	24
2. Total Sq. Footage in Category		90,305	1,266,283	384,191	1,740,779
3. Total Btu Usage (all buildings) ($x10^9$)		12.0397	374.6665	494.8678	881.5740
4. Adjusted Btu Usage after estimated O&M Changes ($x10^9$)		10.8357	281.0005	296.9208	588.7570
5. Estimated Savings for ECM Changes in Percentage if implemented		.045	.045	.045	.045
6. Estimated Btu Savings for ECM ($x10^9$)		.49	12.65	13.36	26.50*

II. Methodology for Estimating ECM Savings

Refer to Volume I -- Making Cents of Your Energy Dollar, page 7.

Percentage of Energy Utilization Total		Possible Percentage of Savings	Mean	Percentage of Total Based on Mean
HVAC	60	0 - 20	3	2
Lighting General Electrical	15	0 - 10	3	.5
Laundry	12	0 - 50	10	1.2
Food Services	7	2 - 20	10	.7
Medical Equipment	4	0 - 10	0	0
Incineration/ Sterilization	2	0 - 50	5	.1
Total				4.5

DATA STUDY #7 - PUBLIC CARE BUILDINGS

Potential Btu Saved for Potential ECMs Recommended*

Buildings included in this study are divided into the following categories:

A. Very efficient--less than 07 Btu/sq ft/DD
B. Efficient--07 to less than 20 Btu/sq ft/DD
C. Inefficient--20 to less than 50 Btu/sq ft/DD
D. Very inefficient--50 Btu/sq ft/DD

I. General Information	A	B	C	D	E
1. Number of Buildings in Category	1	1	7	0	8
2. Total Sq. Footage in Category	unknown	6,322	304,777		311,099
3. Total Btu Usage (all buildings) ($x10^9$)	.4040	1.8477	84.6000		86.8517
4. Adjusted Btu Usage after estimated O&M Changes ($x10^9$)	unknown	1.6627	63.4500		65.5167
5. Estimated Savings for ECM Changes in Percentage if implemented	.00172	.00174	.00172		.00172
6. Estimated Btu Savings for ECM ($x10^9$)	unknown	.0029	.1091	0	.1127*

II. Methodology for Estimating ECM Savings

Refer to Volume I -- Making Cents of Your Energy Dollar, page 10.

Percentage of Energy Utilization Total		Possible Percentage of Savings	Mean	Percentage of Total Based on Mean
HVAC	60	0 - 90	25	15
Lighting General Electrical	18	0 - 10	3	.5
Laundry	9	0 - 50	10	.9
Food Services	7	2 - 20	10	.7
Medical Equipment	4	0 - 10	0	0
Incineration/ Sterilization	2	0 - 50	5	.1
Total				17.2

DATA STUDY #8 - LOCAL GOVERNMENT BUILDINGS

Potential Btu Saved for Potential ECMs Recommended*

Buildings included in this study are divided into the following categories:

A. Very efficient--less than 07 Btu/sq ft/DD
B. Efficient--07 to less than 20 Btu/sq ft/DD
C. Inefficient--20 to less than 50 Btu/sq ft/DD
D. Very inefficient--50 Btu/sq ft/DD

I. General Information	A	B	C	D	E
1. Number of Buildings in Category	1	12	15	3	31
2. Total Sq. Footage in Category	5,300	596,907	314,933	54,000	971,140
3. Total Btu Usage (all buildings) ($x10^9$)	.1747	94.1032	80.5188	66.0239	240.8176
4. Adjusted Btu Usage after estimated O&M Changes ($x10^9$)	.1660	84.6932	60.3868	39.6229	184.8689
5. Estimated Savings for ECM Changes in Percentage if implemented	.26	.26	.26	.26	.26
6. Estimated Btu Savings for ECM ($x10^9$)	.043	22.02	15.70	10.30	

II. Methodology for Estimating ECM Savings

Refer to Volume I -- Making Cents of Your Energy Dollar, page 9.

Percentage of Energy Utilization Total		Possible Percentage of Savings	Mean	Percentage of Total Based on Mean
HVAC	76	0 - 90	25	19
Special Functions	13	0 - 100	30	4
Lighting	11	0 - 50	30	3
	Total			26

COMBINED TOTAL OF DATA STUDY #5, 6, 7, 8

AND ESTIMATED BTU SAVINGS FOR ECM CHANGES*

Buildings included in this study are divided into the following categories:

- A. Very efficient--less than 07 Btu/sq ft/DD
- B. Efficient--07 to less than 20 Btu/sq ft/DD
- C. Inefficient--20 to less than 50 Btu/sq ft/DD
- D. Very inefficient--50 Btu/sq ft/DD
- E. Total each category

I. General Information	A	B	C	D	E
1. Number of Buildings in Category	21	104	72	44	241
2. Total Sq. Footage in Category	583,949	5,073,525	2,935,587	2,114,555	10,707,616
3. Total Btu Usage (all buildings) ($x10^9$)	21.4952	653.3430	763.5089	3366.0005	4804.3476
4. Estimated Btu Savings for O&M changes ($x10^9$)	1.055	65.334	190.877	1346.392	1603.658
5. Adjusted Btu Usage After Estimated O&M Changes ($x10^9$)	20.4492	588.009	707.5769	2243.9565	3200.6896
6. ECM Estimated Btu Savings in Percentage	.1856537	.1856537	.1856537	.1856537	.1856537
II. Estimated Btu Savings for ECM Changes ($x10^9$)					
1. Schools	4.37	107.99	36.91	370.27	519.54
2. Hospitals	0	.49	12.65	13.36	26.50
3. Public Care	unknown	.0029	.1091	0	.1127
4. Local Government	.043	22.02	15.70	10.30	48.07
Est. Total Btu Saved in Category Column $x10^9$	4.41	130.50	65.37	393.93	
Est. Grand Total Btu Saved all Categories $x10^9$					594.22*

PEA SOLAR POTENTIAL DATA

As of October 9, 1979, 317 PEA forms have been processed and the breakdown of solar characteristics are as follows per building category:

	Flat Roof	Roof Pitched South	Roof Pitched Than South	South Wall Glass 0-25%	South Wall Glass 25-75%	S. Wall Glass 75-100%
SCHOOL BUILDINGS						
Elementary	79	9	13	64	33	2
Secondary	44	3	5	30	19	2
College or Univ.	32	7	5	25	18	1
Vocational	5	2	1	7	1	--
Local Admin. Bldg.	3	1	--	3	1	--
Other	13	13	15	35	4	2
	176	35	39	164	76	7
HOSPITAL BUILDINGS						
General	24	3	--	14	13	--
Other	--	--	--	--	--	--
	24	3	--	14	13	--
LOCAL GOVERNMENT BUILDINGS						
Office	6	--	5	10	1	--
Storage	1	--	--	1	--	--
Service	2	2	4	7	1	--
Library	2	--	--	1	1	--
Fire Station	1	--	--	1	--	--
Other	6	1	3	7	3	--
	18	3	12	27	6	
PUBLIC CARE BUILDINGS						
Nursing Home	5	2	1	3	5	--
Rehabilitation Facility	1	--	--	1	--	--
Residential Child Care Center	--	1	--	--	--	1
	6	3	1	4	5	1

The 260 energy conservation measures that have been completed are the results of a comprehensive effort to install energy-saving equipment in public buildings. The number and description of most of these ECMs are listed below:

No. Installed	Description of ECM
51	wall and roof insulation
23	storm window installation
35	air intake control
19	thermal drapes
22	vestibule door
64	caulking and weatherstripping
26	automatic night temperature setback control
5	replacement of windows with R-19 wall
3	replacement of incandescent with fluorescent lighting
2	pipe insulation
1	automatic temperature control

APPENDIX E

Federal Regulations

federal register

Tuesday
April 30, 1985

Part II

Department of Energy

Office of Conservation and Renewable Energy

10 CFR Part 455

Grant Programs for Schools and Hospitals and for Buildings Owned by Units of Local Government and Public Care Institutions; Final Rule

DEPARTMENT OF ENERGY

Office of Conservation and Renewable Energy

10 CFR Part 455

[Docket No. CAS-RM-78-503]

Grant Programs for Schools and Hospitals and for Buildings Owned by Units of Local Government and Public Care Institutions

AGENCY: Conservation and Renewable Energy Office, DOE.

ACTION: Final rule.

SUMMARY: The Department of Energy is issuing a final rule today amending the regulation for the operation of its Grant Programs for Schools and Hospitals and for Buildings Owned by Units of Local Government and Public Care Institutions, commonly called the Institutional Conservation Programs (ICP). The principal amendments in this action are: Ceasing to allow grant funds to be used for costs associated with the installation and connection of leased equipment; permitting the States to establish criteria for, and accept, alternatives to energy audits; allowing demand charges for electricity to be included in energy price calculations; changing the payback limits on projects eligible for funding; adding the quality of technical assistance programs to the factors considered in ranking grant applications; and adding a requirement for DOE approval before certain changes in a grant project can be made. In addition, in this action DOE clarifies how the program regulation would be applied to an institution's use of savings-based financing agreements as matching contributions for ICP grants.

The amendments in the final rule improve the program's ability to assist institutions in conserving energy and reducing energy costs, and thereby increasing the productivity of the institutional sector.

EFFECTIVE DATE: September 1, 1985 for all changes with the exception of the change to § 455.63, which shall become effective October 1, 1985.

FOR FURTHER INFORMATION CONTACT:

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SUPPLEMENTARY INFORMATION:

I. Introduction and Description of the Program
II. Savings-Based Financing Agreements as Matching Contributions for ICP Grants
III. Amendments to the Grant Institutional Conservation Programs
IV. Environmental, Regulatory Impact, Small Entity Impact and Paperwork Reduction Act Reviews

I. Introduction and Description of the Program

The Department of Energy (DOE) is amending the regulation for the Grant Programs for Schools and Hospitals and for Buildings Owned by Units of Local Government and Public Care Institutions, also known as the Institutional Conservation Program (program, Institutional Conservation Program, or ICP), 10 CFR Part 455, issued under Title III of the National Energy Conservation Policy Act, Pub. L. 95-619, 92 Stat. 3238, 42 U.S.C. 6371 *et seq.* (the Act).

The purpose of today's action is to improve the operation of the Institutional Conservation Program. The Department is taking this action based in part on the responses to a Notice of Inquiry (NOI) published by DOE in the Federal Register on January 23, 1984 (49 FR 2848), and to a Notice of Proposed Rulemaking (NOPR) published by DOE in the Federal Register on August 28, 1984 (49 FR 34164). The NOI and NOPR solicited public comments about a number of specific areas of program policy and management and about the program generally.

The Act established that the program's basic goal is to reduce energy use and costs in institutional buildings. To accomplish this goal, the Act authorizes DOE to establish cost sharing (the terms cost sharing and matching are used interchangeably in this preamble and in the program's regulations) energy conservation grant programs to fund detailed energy audits, called technical assistance programs (TA's), of public and private nonprofit schools, hospitals, and buildings owned by units of local government and public care institutions, and to fund the purchase and installation of energy conservation materials and equipment, called energy conservation measures (ECM's), in schools and hospitals.

The TA analyses identify changes in maintenance and operating procedures and identify new equipment or materials which would cost effectively conserve energy in an institution's buildings. Implementation of the maintenance and operating procedures and installation of the new energy conservation measures contribute to energy conservation not only in the building concerned, but also, by extension, in other buildings, by demonstrating the validity of energy conservation efficiency and management.

II. Savings-Based Financing Agreements as Matching Contributions for ICP Grants

The NOPR addressed a number of areas relating to the use of savings-based agreements as matching contributions for ICP grants. Much of the discussion in the NOPR was based on concerns expressed, or approaches to the issue suggested by letters responding to the NOI. A number of further concerns have arisen as a result of the discussion in the NOPR. The principle concerns are discussed below. For the original discussion on this matter, see the August 28, 1984 NOPR (49 FR 34164).

Savings-based financing agreements provide for the purchase and installation of energy conservation equipment or materials based on the savings produced by the ECM. In general, such agreements do not require an initial capital investment on the part of the institution for the equipment installed under the agreement.

DOE believes that such agreements could aid institutions to reduce their energy use and costs and thus further the goal of institutional energy conservation. In order to maximize the use of Federal program funds and enhance energy conservation, DOE urges institutions wishing to install conservation improvements to explore all possible funding sources and apply for an ICP grant only if alternative financing is not feasible.

Savings-based agreements may also be used as a match for an ICP grant, if the agreements meet the requirements of program regulations. Therefore, DOE is taking this opportunity to explain how the regulations apply to these types of agreements.

Savings-based agreements offered to meet the matching or cost sharing requirements of § 455.82(e) may not provide for the retention of title or ownership in any equipment by the supplier or other party beyond the date of project closeout.

In order to avoid conflict of interest, prohibited by the regulations, a savings-based agreement may not provide for a TA analyst to participate in the subsequent installation of the ECM's recommended in the TA. Even though Energy Service Companies will do their own engineering analysis as the basis for the energy service contract, this analysis may not be used as the Technical Assistance Analysis (TA) in the grant application. The TA must be done by an independent analyst.

The regulations require that costs must be established by adequate documentation. In the case of a savings-based agreement compliance with this provision may be achieved by submitting invoices of the supplier or similar documentation.

DOE considers a project ready for closeout under the regulations when the improvements have been made, the equipment has been installed, and all activities specified in the grant award have been completed. Closeout need not be delayed until the end of the period during which the savings are to be shared under a savings-based agreement.

DOE hopes this discussion clarifies its position relating to the possible use of savings-based agreements to match DOE grants. Since these financing arrangements are relatively new, changes to the regulations may be warranted in the future. For the present, however, the current regulations appear sufficient.

III. Amendments to the Institutional Conservation Programs

In this document, DOE has made several changes to the regulation which will better enable the program to achieve its purposes of reducing energy use and costs in institutional buildings and demonstrating the validity of energy conservation efficiency and management in actual situations.

Many commenters expressed concern that the changes might apply to ICP funding Cycle VII, which is currently underway. DOE recognizes that it is too late to make these changes applicable to Cycle VII, and has accordingly established two effective dates to coincide with the closing dates of Cycle VII. September 1, 1985 was established as the effective date for all revisions with the exception of § 455.63. The effective date of the revisions to § 455.63(b)(5) (requirement for quarterly financial assistance reports from States) is October 1, 1985. Although final action may not be taken under Cycle VIII prior to the appropriate effective date, affected parties are not precluded from preparing for the necessary changes in advance of those dates.

The principal changes made to the regulation are: Ceasing to allow grant funds to be used for some costs associated with leasing equipment; permitting the States to establish criteria for, and accept, alternatives to energy audits; allowing demand charges for electricity to be included in energy prices; changing the payback limits on projects eligible for funding; adding the quality of technical assistance programs to the factors considered in ranking grant applications; and adding a requirement for DOE approval before certain changes in a grant project can be made. In addition, technical changes are made, including clarification of Davis-Bacon requirements, adding the Northern Mariana Islands to the listed areas where institutions are eligible to receive grants, and simplifying the references to renewable resource reviews. The changes are in response to experience gained in administering the program, and to comments submitted in response to the NOI and the NOPR.

A number of the changes proposed in the NOPR are not being made, because of persuasive arguments made by commenters to the NOPR. Those proposed changes were: Changing the definition of "energy conservation measure" to eliminate measures required primarily because existing measures have been poorly maintained, requiring technical assistance program analysts to identify measures which have been poorly maintained, and establishing more detailed requirements for applications for State Administrative grants.

Proposed Changes to Each Section, Comments Received, and DOE's Final Action

The following discussion describes DOE's proposed change(s) to each section, comments received regarding those proposed changes, and DOE's final action.

Section 455.1 Purpose and scope.

DOE proposed to amend this section (and all subsequent sections where the same phrase exists) by changing the term "solar energy or other renewable resource measures" to simply "renewable resource measures". Nine favorable comments were received on this change, and no unfavorable comments were received. Accordingly, DOE has finalized the change as proposed.

Section 455.2 Definitions.

DOE proposed to amend the definition of "Energy Conservation Measure" to state that DOE does not consider as an ECM, and consequently will not fund, measures which are necessary primarily because existing equipment or material has poorly maintained, or not maintained at all. Over half of all the commenters to the NOPR addressed this issue, with the majority opposed to the change, primarily because of concerns about the subjectivity of the term "poorly maintained," the difficulty of ascertaining neglect (particularly with older equipment where normal wear and tear might be confused with neglect), and the inability of DOE or the States to enforce this on a consistent basis. Some commenters even felt that DOE should not penalize institutions which may, in the past, have neglected maintenance, by refusing to fund replacement improvements. While DOE continues to be concerned about neglected equipment, and wants to encourage proper maintenance, DOE felt the arguments against this change were persuasive, and is therefore not adopting this change (or the related change in § 455.42 which will be discussed later under that section).

DOE also proposed to amend the definition of "Energy Conservation Measure" to eliminate costs associated with the installation and connection of leased equipment as an allowable cost, because it no longer served the original purpose. A number of commenters supported DOE's proposal and some of them pointed out that if an institution can obtain equipment by means of lease-purchase, it should not need an ICP grant for that equipment. Those objecting to the proposal did not disagree with this reasoning. They did, however, raise the larger question of whether DOE should fund leased-equipment. That question is beyond the scope of this proposal and the commenters did not advance any reasons to broaden the scope of the rulemaking and to cause DOE to reconsider its existing policy in the treatment of leased-equipment.

DOE proposed expanding the definition of "Energy Conservation Measure" to include energy use evaluations. No significant comments were received on this proposed change, and it has been adopted as proposed.

DOE proposed adding a definition for "energy use evaluation" to conform to the proposed new § 455.20. One commenter indicated some concern that DOE might be intending to drop the energy audit requirement as part of this change, which DOE was not, in fact, proposing. The energy use evaluation is an added option which each State can decide to use or not. The other comments on this change were positive, and the change has been adopted as proposed.

DOE proposed to amend the definition of "heating and cooling system" by eliminating the word "conditioned." There were no significant comments received on this proposed change, and it is being adopted as proposed.

DOE proposed to amend the definition of "State" to include the Northern Mariana Islands. This proposal was based on section 502(a) of Article V of the Covenant to Establish a Commonwealth of the Northern Mariana Islands in Political Union with the United States of America, 48 U.S.C. 1681 note. Additionally, shortly after the NOPR was published, Pub. L. 98–454 was enacted into law, 98 Stat. 1732 (October 5, 1984). Section 601(e) of the law amended the Energy Policy and Conservation Act to specify that the Northern Mariana Islands are included in the ICP definition of "State." Accordingly, the change is being adopted as proposed.

DOE proposed amending the definition of "unit of local government" by eliminating references to governmental entities already included in the definition of "State." There were no comments on this change and it is being adopted as proposed.

Section 455.3 Administration of grants.

DOE proposed to amend this section to delete references to a variety of documents from other agencies because the provisions of these documents are now covered by the DOE Financial Assistance Rules, 10 CFR Part 600. There were no comments on this change and it is being adopted as proposed.

Section 455.4 Recordkeeping.

DOE proposed amending this section to refer to the DOE Financial Assistance Rules, 10 CFR Part 600, as they relate to recordkeeping requirements for the program. No significant comments were received on this change and it is being adopted as proposed.

Section 455.5 Suspension and termination of grants.

DOE proposed amending this section to refer to the DOE Financial Assistance Rules, 10 CFR 600, as they relate to procedures for suspension and termination of grants. No significant comments were received on this change and it is being adopted as proposed.

Section 455.20 Contents of any energy use evaluation.

DOE proposed adding this section to describe the information required to be submitted in lieu of an energy audit in cases where an energy audit has not been performed on a building, and where the State has elected to accept an alternative energy use evaluation in accordance with new § 455.90(1). A number of commenters felt the existing energy audit (which requires more information than an energy use evaluation) should continue to be the only choice. Other commenters felt that neither an energy audit nor an energy use evaluation should be required, since they are no longer funded by DOE. On the other hand, a good many commenters felt that the energy use evaluation was a worthwhile option. Because of the necessity for certain information, DOE has always required an energy audit or its equivalent as a qualifying step for obtaining a grant for a technical assistance program. Therefore DOE feels it cannot drop the requirement for an energy audit or its equivalent altogether. However, DOE does feel it is appropriate to offer the States an option to adopt a simpler energy use evaluation if they choose to do so, in order to reduce the burden on applicants who have not already had energy audits done previously in the ICP program. Therefore, this section is being added as proposed.

Section 455.42 Contents of program.

DOE proposed amending paragraph (a) of this section to make it clear that a TA report should be acceptable with regard both to DOE's requirements as to content, cost and savings calculations, and other factors set forth in § 455.42 and to the State's procedures for implementing those DOE requirements. All the commenters who addressed this change thought it was a good idea, and it is being finalized as proposed. DOE notes that the TA should be considered an energy and financial management tool to assist an institution in implementing all future energy conservation actions, not just those associated with an ICP grant.

DOE also proposed to amend paragraph (b) of this section to add a sentence at the end of the paragraph to require that the technical assistance analyst identify any energy conservation improvement in the TA which is necessary primarily because the existing energy conservation equipment or material it would replace has been poorly maintained, or not maintained at all. Most of the commenters who addressed this issue expressed the concern that it would be very difficult (in some cases impossible) to determine when equipment had been neglected, and that the very idea of neglect was subjective. DOE has decided not to adopt this proposed change. A more complete discussion of this issue occurs above under the § 455.2 Definitions part of this preamble, where a related proposed change in the definition of ECM has also not been adopted.

DOE proposed amending paragraphs (c)(1) and (b)(5)(vi) of this section to drop the exclusion of demand charges for electricity from current prices, and permit those demand charges to be included in calculating energy cost savings. Over half of the commenters addressed this issue, virtually all of whom thought it was a good idea. A number of commenters, however, apparently interpreted the word "permit" in the preamble to the NOPR to mean that DOE was not requiring demand charges to be included in energy costs, and expressed concern that if it was optional, then such charges would only be included when they would favorably affect payback. DOE did not intend this to be an optional change, and is adding specific references to demand charges in the appropriate places in each of the affected paragraphs to make it clear that demand charges are to be included in current energy prices. However, DOE would like to reiterate here what was stated in the NOPR, that DOE hopes that technical assistance analysts and institutions will continue their efforts to direct energy usage away from peak periods wherever possible.

DOE also proposed dropping paragraph (d)(5)(vii)(C) from this section. This paragraph related to costs associated with leased equipment. There were no comments on this proposed change and it is being adopted as proposed. The issue of costs associated with leased equipment has already been discussed in more detail in this preamble under § 455.2 Definitions.

Section 455.51 Eligibility.

DOE proposed amending paragraph (b) of this section to change the permissible payback period range from "shall not be less than 1 year nor greater than 15 years" to "shall not be less than 2 years nor greater than 10 years." This change was proposed in response both to the NOI comments and to DOE's experience with the program. It was primarily motivated by the awareness that there were limited grant funds available, and literally thousands of potentially eligible institutions seeking assistance. Therefore, it was time for DOE to concentrate on funding those measures which had paybacks (1) somewhat beyond the range of what most institutions could reasonably be expected to be able to fund out of operating funds or other readily available resources, yet (2) not so long that meaningful savings projections (or even equipment durability or technological up-to-dateness) are impossible to determine. A 2 to 10 year payback range was felt to be reasonable in light of these considerations.

Most of the commenters (47 of 60) addressed this issue. A number of commenters thought the proposed change was a good one, but the majority objected, particularly to raising the minimum to 2 years. These commenters pointed out that there were still many 1 to 2 year payback measures which had not been funded, and expressed concern that if the change were adopted, such measures might never be installed. A few commenters were also concerned about lowering the maximum payback to 10 years, pointing out that there were worthwhile ECM's with over 10 year paybacks (particularly renewable measures).

DOE acknowledges these concerns, but still believes it is necessary to focus the resources of ICP on those measures which cannot be easily funded through other means yet which have the best chance of achieving estimated savings over future years.

A number of respondents to the NOPR pointed out that over the program's six funding cycles a great many institutions have benefited from ICP grants, and often those institutions have gone on to pursue other conservation efforts on their own, based on the favorable experience gained through the ICP grant process. In addition, recipient institutions often serve as positive examples to others wanting to conserve energy. DOE recognizes this important aspect of the program, and feels that ICP has by now amply demonstrated the wisdom of implementing relatively short payback conservation improvements (i.e., those with less than a 2 years payback). DOE believes it is now time to move the demonstration to the next step by limiting ICP grant funding to measures with paybacks of 2 years or more. Therefore, this change has been finalized as proposed.

A number of commenters on this change also raised a question about the definition of operations and maintenance procedures. Because § 455.42(d)(5)(vi)(A) requires that TA's must "Assume that all energy savings obtained from energy conservation maintenance and operating procedures have been realized," some commenters inferred that DOE meant to require that all measures with paybacks of less than 2 years would be considered maintenance and operating procedures, and all such measures would have to be implemented before an applicant would qualify for an ECM grant. This is not DOE's intention, and, in fact, maintenance and operating procedures are not defined in terms of payback. A list of examples of maintenance and operating procedures is provided in § 455.19(b)(2).

Evidently some commenters felt that any conservation improvement with a payback of less than a year was automatically considered a maintenance and operating procedure under the old payback range of 1 to 15 years. That was never the case, and, as one commenter correctly pointed out, there conceivably could be some operating and maintenance procedures with longer than 1 or 2 year paybacks, but they would not become ECM's once their payback exceeded some period of time. Conversely, a measure with a payback of less than 1 or 2 years would not become an operating and maintenance procedure by virtue of its payback.

In a related matter, one commenter thought that life cycle costing might be a better approach to use, to evaluate conservation investments, than simple payback. DOE has considered the use of life cycle costing in ICP, and allows for the inclusion of a life cycle cost analysis in a TA if the institution elects it. § 455.42(d)(vii). Because simple payback is easier to understand and less speculative to calculate, it remains the primary evaluation mechanism under the program.

Section 455.62 Grant applications State administrative expenses.

DOE proposed to amend paragraph (b)(2) of this section to require more specific plans from the States concerning how they propose to administer the program and how they propose to use their administrative grants. About one fourth of the commenters addressed this issue, with most indicating that this would place an added burden on the States, which do not all have the resources available to handle additional tasks, due to limited administrative grants. (States administrative grants are restricted to $30,000 or 5 percent of the schools and hospitals grants awarded in a year, whichever is greater.) While DOE continues to be concerned that States provide it with meaningful applications for administrative grants, DOE recognizes that State resources vary considerably. DOE is therefore not adopting this change. However, DOE would encourage States which must (because of State requirements) prepare plans along the lines of the proposed change, or other detailed annual plans, to forward copies of such plans to DOE. States should also keep in mind the budget reporting requirements set forth in the DOE Financial Assistance Rules, (10 CFR 600.10), which apply to State administrative grants.

Section 455.63 Grantee records and reports.

DOE proposed amending paragraph (b)(3) of this section to require the reports concerning State administrative grants to discuss the State's progress toward accomplishing the State responsibilities set forth in the annualized plans submitted in accordance with proposed new § 455.62(b)(2). For reasons discussed above under § 455.62, DOE has decided not to adopt the proposed new § 455.62(b)(2). Consequently, DOE has decided not to adopt this proposed change to § 455.63.

DOE also proposed amending this section to require financial status reports for State administrative grants to be filed on a quarterly basis, rather than a semi-annual basis. There were relatively few comments on this proposed change, and most were in favor of it. DOE has therefore decided to adopt this change as proposed.

Section 455.71 State ranking of grant applications.

DOE proposed amending this section to add a new § 455.71(b)(4) to require that TA report quality be added to the ranking factors used to determine which applications are accepted for grants. This proposed change was based on comments received in response to the NOI and on DOE's awareness, from its experience in operating the program, that TA's often inadequately reflect the work needing to be done in a building, or include cost estimates and other calculations which turn out to be incorrect, sometimes causing problems later with cost overruns, etc. Over two-thirds of the commenters addressed this issue, with the majority opposed to the change because of concerns that judging TA quality would be too subjective, too time consuming or otherwise too difficult to do in a realistic way. Even some commenters who thought the change was a good idea felt it might be difficult to define what TA quality was. However, a number of commenters also felt the change was a good one, and would help to encourage better quality TA's.

DOE and the States have now managed ICP through six funding cycles. Thousands of TA and ECM grants have been made. Many States have developed guidelines for TA's, or have otherwise specified what they expected in a TA. The Pacific Northwest Laboratory has prepared a manual for DOE which includes an extensive section on TA reports. The National Society of Professional Engineers has worked closely with DOE on a project to develop a suggested TA format, based on extensive ICP experience (this TA report should be available early in 1985). In addition, DOE has sponsored regional training sessions on TA's and many States have regular or occasional training or briefing sessions on TA preparation. Therefore, DOE believes that it will be possible for each State to define TA quality based on its particular needs, its experience, and the experience of others in reviewing and monitoring TA and ECM grants. Consequently, DOE is adopting this change as proposed.

Section 455.80 Approval of grant applications.

DOE proposed adding a new paragraph (f) to § 455.82, to require that a grantee request approval from DOE before (1) transferring DOE funds or matching amounts between buildings when the State ranks applications by buildings, or (2) transferring DOE funds or matching amounts between measures when the State ranks applications by measure. The proposed change would have applied only when the transfer of amounts increased the payback of the measure or building for which the transferred funds were to be used. DOE subsequently decided that this new requirement would more appropriately be included in § 455.80, and, consequently, a new paragraph (g) is being added to § 455.80 instead of the proposed new paragraph (f) to § 455.82.

In the preamble to the NOPR, DOE indicated that there was some question as to the necessity of obtaining a deviation from the Office of Management and Budget (OMB) to implement this change, since it might exceed the prior approval and rebudgeting requirements of OMB Circulars A-102 and A-110. It has been determined that this prior approval requirement is programmatic rather than budgetary, and is therefore authorized pursuant to the DOE Financial Assistance Rules, 10 CFR 600.114(d)(2). Consequently, no deviation is required.

While the comments varied on this proposed change, most commenters felt it was a good idea. DOE believes that this change is necessary to ensure the integrity of the ranking process, which is largely based on payback, and has adopted the change. However, it has been pointed out that adding costs to a measure or a building would always increase the payback, so DOE should review all transfers of funds from one measure or building to another. DOE has therefore revised the wording of this paragraph to reflect this reality, and has made some revisions to more clearly relate this requirement to the DOE Financial Assistance Rules. DOE notes, however, that the review required by this change is limited to the matter of payback as it relates to the ranking process. Prior review of proposed budget or project changes shall not be required for any other purpose unless otherwise authorized by the DOE Financial Assistance Rules.

With regard to the change just discussed, a number of commenters raised questions about DOE's intentions in cases where a measure or a building would not have ranked at the higher cost resulting from a funds transfer from another measure or building. Concern was expressed that DOE might insist that the grantee return the entire amount budgeted for the measure or building in question, if it did not rank at the higher cost. In fact, DOE would not do this, but DOE might not approve use of DOE funds or matching grant funds for the entire additional cost. In such a situation, DOE would limit approval of cost increases to amounts which are not so large as to reduce the ranking of the building or ECM in question below the cutoff for the the State in the grant program cycle during which that grant was awarded.

Section 455.81 Grant awards for units of local government and public care institutions.

In response to the need expressed by institutions in the territories, DOE proposed to amend this section, and §§ 455.82 and 455.83 to eliminate the 50 percent matching requirement for the Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands, as permitted under section 501(d) of the Omnibus Territories Act of 1977, as amended, 48 U.S.C. 1469a(d). Only a few comments were received on these changes, all in favor of them. DOE is therefore adopting these changes as proposed.

Section 455.82 Grant awards for schools and hospitals.

As discussed previously under § 455.81, DOE proposed to amend paragraph (b) to waive the requirement for matching funds for certain insular areas. No comments were received on this proposed change, and it is adopted as proposed.

DOE proposed to amend paragraph (e) to make it clear that DOE does not intend for the Davis-Bacon Act to apply to projects which are being used as a credit toward meeting the matching non-federal funds requirement. No significant comments were received on this proposed change, and it has been adopted as proposed.

Section 455.83 Grant awards for State administrative expenses.

As discussed under § 455.81, DOE proposed amending paragraphs (a)(1) and (a)(2) to waive the requirement for matching funds for certain insular areas. No comments were received on this proposed change, and it is adopted as proposed.

DOE proposed amending paragraph (c)(3) to change the threshold amount that might be paid for a single item of equipment from $300 to $500, to bring the program regulations into agreement with the DOE Financial Assistance Rules. There were no comments on this proposed change, and it is being adopted as proposed.

Section 455.90 Contents of State plan.

DOE proposed amending this section to allow each State to decide under what circumstances it will accept a briefer alternative to the EA, and what information it will require in lieu of an EA. There were no significant comments received on this proposed change, and it is being adopted as proposed.

IV. Environmental Regulatory Impact, Small Entity Impact, and Paperwork Reduction Act Reviews

A. Environmental Review

Pursuant to the requirements of the National Environmental Policy Act of 1969 (NEPA), Pub. L. 91-190, 83 Stat. 852 (42 U.S.C. 4321 *et seq.*), DOE published a Notice of Availability of an Environmental Assessment (EA) of the entire Title III program on March 12, 1979 in the **Federal Register**, 44 FR 13554. Based on this assessment DOE determined that the NECPA Title III program did not constitute a major Federal action significantly affecting the quality of the human environment, and the therefore no Environmental Impact Statement (EIS), was required.

DOE has reviewed the environmental impacts of the program amendment issued today. It is DOE's judgment that the program amendment will result in no environmental impacts not previously analyzed in the EA on the program. Accordingly, DOE has determined that the enviromental impacts of the program as modified by today's amendment have been adequately analyzed in the March 1979 EA, and that these impacts are not significant. Hence, the previous negative determination is still applicable, and no additional EA or EIS is required.

B. Review Under Executive Order 12291

Today's issuance was reviewed under Executive Order 12291 (46 FR 13193 February 19, 1981). DOE has concluded that the rule is not a "major rule" under the Executive Order, because it will not result in: (1) An annual effect on the economy of $10 million or more; (2) a major increase in costs or prices for consumers, individual industries, State, Federal, or local government agencies, or geographic regions; or (3) significant adverse effects on competition, employment, investment, productivity, innovation, or on the ability of the United States-based enterprises to compete with foreign-based enterprises in domestic or export markets. Pursuant to section 3(c)(3) of Executive Order 12291, this rule was submitted to the Director of OMB for a ten-day review. The Director has concluded his review under that Executive Order.

C. Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) requires, in part, that an agency prepare a final regulatory flexibility analysis for any final rule, unless it determines that the rule will not have "significant economic impact on a substantial number or small entities." In the event that such an analysis is not required for a particular rule, the agency must publish a certification and an explanation of that determination in the Federal Register. The changes made in this final rule primarily add flexibility to the existing program. Thus, these changes have a minimal effect on small entities. Accordingly, pursuant to section 695(a) of the Regulatory Flexibility Act, DOE certifies that this rule will not have a significant economic impact on a substantial number of small entities.

D. Paperwork Reduction Act

The information collection requirements adopted in this amendment have been approved by OMB in accordance with section 3504(b) of the Paperwork Reduction Act, Pub. L. 96–511, 94 Stat. 2812 (44 U.S.C. 3501 *et seq.*) and procedures implementing that Act (5 CFR 1320.1 *et seq.*) The OMB control number is 1910–1400.

E. Catalogue of Federal Domestic Assistance

The Catalogue of Federal Domestic Assistance number for the Grant Programs for Schools and Hospitals is 81.052.

List of Subjects in 10 CFR Part 455

Buildings, Community facilities, Energy audits, Energy conservation, Grant programs, Energy, Health facilities, Hospitals, Reporting and recordkeeping requirements, Schools, Solar energy, Technical assistance.

In consideration of the foregoing, DOE hereby revises Chapter II, Title 10, Part 455, Code of Federal Regulations, as set forth below.

Issued in Washington, D.C., April 12, 1985.

Donna R. Fitzpatrick,

Acting Assistant Secretary, Conservation and Renewable Energy.

Part 455 is revised to read as set forth below:

PART 455—GRANT PROGRAMS FOR SCHOOLS AND HOSPITALS AND BUILDINGS OWNED BY UNITS OF LOCAL GOVERNMENT AND PUBLIC CARE INSTITUTIONS

Subpart A—General Provisions

Sec.
455.1 Purpose and scope.
455.2 Definitions.
455.3 Administration of grants.
455.4 Recordkeeping.
455.5 Suspension and termination of grants.

Subpart B—Preliminary Energy Audit and Energy Audit Grant Procedures

455.10 Purpose and scope.
455.11 Financial assistance.
455.12 Cost sharing.
455.13 Allocation of funds.
455.14 Submission and review of applications.
455.15 Content of applications.
455.16 Use of funds.
455.17 Reporting requirements.
455.18 Contents of a preliminary energy audit.
455.19 Contents of an energy audit.
455.20 Contents of an energy use evaluation.

Subpart C—Technical Assistance Programs for Schools, Hospitals, Units of Local Government and Public Care Institutions

455.40 Purpose and scope.
455.41 Eligibility.
455.42 Contents of program.

Subpart D—Energy Conservation Measures for Schools and Hospitals

455.50 Purpose and scope.
455.51 Eligibility.
455.52 Contents of program.

Subpart E—Applicant Responsibilities

455.60 Grant application submittals.
455.61 Applicant certifications.
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455.63 Grantee records and reports.

Subpart F—State Responsibilities

455.70 State evaluation of grant applications.
455.71 State ranking of grant applications.
455.72 Forwarding of applications.
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Subpart G—Grant Awards

455.80 Approval of grant applications.
455.81 Grant awards for units of local government and public care institutions.
455.82 Grant awards for schools and hospitals.
455.83 Grant awards for State administrative expenses.

Subpart H—State Plan Development and Approval

455.90 Contents of State plan.
455.91 Submission and approval of State plans.
455.92 State plans developed by the Secretary.

Subpart I—Allocation of Appropriations Among the States

455.100 Allocation of funds.
455.101 Allocation formulas.
455.102 Reallocation of funds.

Authority: Title III of the National Energy Conservation Policy Act, Pub. L. 95–619, 92 Stat. 3238 (42 U.S.C. 6371 *et seq.*); and Department of Energy Organization Act, Pub. L. 95–91, 91 Stat. 565 (42 U.S.C. 7101 *et seq.*)

Subpart A—General Provisions

§ 455.1 Purpose and scope.

(a) This part establishes programs of financial assistance pursuant to Parts 1 and 2 of Title III of the National Energy Conservation Policy Act, Pub. L. 95–619, 92 Stat. 3238 (42 U.S.C. 6371 *et seq.*) which add Parts G and H, respectively, to Title III of the Energy Policy and Conservation Act, Pub. L. 94–163, 89 Stat. 901 (42 U.S.C. 6291).

(b) This subpart authorizes grants to States or to public or nonprofit schools and hospitals to assist them in conducting preliminary energy audits and energy audits, in identifying and implementing energy conservation maintenance and operating procedures, and in evaluating, acquiring and installing energy conservation measures, including renewable resource measures, to reduce the energy use and anticipated energy costs of buildings owned by schools and hospitals.

(c) This subpart also authorizes grants to States or units of local government and public care institutions to assist them in conducting preliminary energy audits and energy audits, in identifying and implementing energy conservation maintenance and operating procedures, and evaluating energy conservation measures, including renewable resource measures, to reduce the energy use and anticipated energy costs of buildings owned by units of local government and public care institutions.

§ 455.2 Definitions.

"Act," as used in this part, means the Energy Policy and Conservation Act, Pub. L. 94–163, 89 Stat. 871 (42 U.S.C. 6201 *et seq.*), *as amended* by Title III of the National Energy Conservation Policy Act, Pub. L. 95–619, 92 Stat. 3238 (42 U.S.C. 6371).

"Auditor" means any person who is qualified in accordance with 10 CFR 450.44 to conduct an energy audit.

"Building" means any structure, the construction of which was completed on or before April 20, 1977, which includes a heating or cooling system, or both.

"Civil rights requirements" means civil rights responsibilities of applicants and grantees pursuant to the Nondiscrimination in Federally Assisted Programs regulation of the Department of Energy (10 CFR Part 1040).

"Complex" means a closely situated group of buildings on a contiguous site, or a closely situated group of buildings served by a central utility plant, such as a college campus or a multi-building hospital.

"Construction completion" means the date of issuance of an occupancy permit for a building or the date the building is ready for occupancy as determined by DOE.

"Cooling degree days" means the annual sum of the number of Fahrenheit degrees of each day's mean temperature above 65° for a given locality.

"Coordinating agency" means any public or nonprofit organization legally constituted within a State for either administrative control or services for a group of institutions within a State and which acts, and is authorized by eligible institutions to so act, as the agent for such institutions with respect to their participation in the program.

"DOE" means the Department of Energy.

"Energy audit" means any survey of a building or complex conducted in accordance with the requirements of § 455.19.

"Energy conservation maintenance and operating procedures" means modifications in the maintenance and operations of a building, and any installation therein, which are designed to reduce the energy use in such building and which require no significant expenditure of funds.

"Energy conservation measure" means an installation or modification of an installation in a building which is primarily intended to reduce energy consumption or allow the use of an alternative energy source and which may contain integral control and measurement devices, but which is not an installation of leased equipment, including, but not limited to—

(a) Insulation of the building structure and systems within the building;

(b) Storm windows and doors, multiglazed windows and doors, heat absorbing or heat reflective glazed and coated windows and door systems, additional glazing, reductions in glass area, and other window and door systems modifications;

(c) Automatic energy control systems which would reduce energy consumption;

(d) Equipment required to operate variable steam, hydraulic, and ventilating systems adjusted by automatic energy control systems;

(e) Active or passive solar space heating or cooling systems, solar electric generating systems, or any combination thereof;

(f) Active or passive solar water heating systems;

(g) Furnace or utility plant and distribution system modifications including—

(1) Replacement burners, furnaces, boilers, or any combination thereof, which substantially increase the energy efficiency of the heating system;

(2) Devices for modifying flue openings which will increase the energy efficiency of the heating system;

(3) Electrical or mechanical furnace ignition systems which replace standing gas pilot lights; and

(4) Utility plant system conversion measures including conversion of existing oil and gas-fired boiler installations to alternative energy sources, including coal;

(h) Addition of caulking and weatherstripping;

(i) Replacement or modification of lighting fixtures to increase the energy efficiency of the lighting system without increasing the overall illumination of a facility, unless such increase in illumination is necessary to conform to any applicable State or local building code or, if no such code applies, the increase is considered appropriate by the Secretary;

(j) Energy recovery systems;

(k) Cogeneration systems which produce steam or forms of energy such as heat, as well as electricity for use primarily within a building or a complex of buildings owned by an eligible institution and which meet such fuel efficiency requirements as the Secretary may by rule prescribe;

(l) Such other measures as the Secretary identifies by rule for purposes of this part, as set forth in Subpart D of 10 CFR Part 450; and

(m) Such other measures as a grant application shows will save a substantial amount of energy and are identified in an energy audit in accordance with § 455.19, its equivalent, an energy use evaluation, or a technical assistance report.

"Energy use evaluation" means an evaluation of the energy use characteristics of a building, which may be used in place of an energy audit when a State has made provision for such use in its State plan and must contain the information set forth in § 455.20.

"Fuel" means any commercial source of energy used within the building or complex being surveyed such as natural gas, fuel oil, electricity, or coal.

"Governor" means the chief executive officer of a State, including the Mayor of the District of Columbia, or a person duly designated in writing by the Governor to act on her or his behalf.

"Grantee" means the entity or organization named in the Notice of Financial Assistance Award as the recipient of the grant.

"Grant program cycle" means the period of time specified by DOE which relates to the fiscal year or years for which monies are appropriated for grants under this part, during which one complete cycle of DOE grant activity occurs, including fund allocations to the States; applications receipt, review, approval or disapproval; and award of grants by DOE, but which does not include the grantee's performance period.

"Gross square feet" means the sum of all heated or cooled floor areas enclosed in a building, calculated from the outside dimensions, or from the centerline of common walls.

"Heating or cooling system" means any mechanical system for heating, cooling or ventilating areas of a building, including a system of through-the-wall air conditioning units.

"Heating degree days" means the annual sum of the number of Fahrenheit degrees for each day's mean temperature below 65° for a given locality.

"Hospital" means a public or nonprofit institution which is a general hospital, tuberculosis hospital, or any other type of hospital, other than a hospital furnishing primarily domiciliary care; and which is duly authorized to provide hospital services under the laws of the State in which it is situated.

"Hospital facilities" means buildings housing a hospital and related facilities, including laboratories, laundries, outpatient departments, nurses' home and training facilities and central service facilities operated in connection with a hospital, and also includes buildings housing education or training facilities for health professions personnel operated as a integral part of a hospital.

"Indian tribe" means any tribe, band, nation, or other organized group or community of Indians, including any Alaska native village, or regional or village corporation, as defined in or established pursuant to the Alaska Native Claims Settlement Act, Pub. L. 92-203; 85 Stat. 688, which (a) is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians; or (b) is located on, or in proximity to, a Federal or State reservation or rancheria.

"Local educational agency" means a public board of education or other public authority or a nonprofit institution legally constituted within, or otherwise recognized by, a State for either administrative control or direction of, or to perform administrative services for, a group of schools within a State.

"Maintenance" means activities undertaken in a building to assure that equipment and energy-using systems operate effectively and efficiently.

"Native American" means a person who is a member of an Indian tribe.

"Operating" means the operation of equipment and energy-using systems in a building to achieve or maintain specified levels of environmental conditions of service.

"Owned" or "Owns" means property interest, including without limitation a leasehold interest, which is, or shall become, a fee simple title in a building or complex.

"Preliminary energy audit" means any survey of a building or complex conducted in accordance with the requirements of § 455.18.

"Primarily occupied" means that in excess of 50 percent of a building's square footage or time of occupancy is occupied by a public care Institution or an office or agency of a unit of local government.

"Public care Institution" means a public or nonprofit institution which owns—

(a) A facility for long-term care, rehabilitation facility, or public health center, as described in section 1633 of the Public Health Service Act (42 U.S.C. 300s-3; 88 Stat. 2270); or

(b) A residential child care center, which is an institution, other than a foster home, operated by a public or nonprofit institution and is primarily intended to provide full-time residential care with an average length of stay of at least 30 days for at least 10 minor persons who are in the care of such institution as a result of a finding of abandonment or neglect or of being persons in need of treatment or supervision.

"Public or nonprofit institution" means an institution owned and operated by—

(a) A State, a political subdivision of a State or an agency or instrumentality of either; or

(b) A school or hospital which is, or would be in the case of such entities situated in American Samoa, Guam, Puerto Rico, the Commonwealth of the Northern Mariana Islands, and the Virgin Islands, exempt from income tax under section 501(c)(3) of the Internal Revenue Code of 1954; or

(c) A unit of local government or public care institution which is, or would be in the case of such entities situated in American Samoa, Guam, Puerto Rico, the Commonwealth of the Northern Mariana Islands, and the Virgin Islands, exempt from income tax under section 510(c)(3) or 501(c)(4) of the Internal Revenue Code of 1954.

"School" means a public or nonprofit institution which—

(a) Provides, and is legally authorized to provide, elementary education or secondary education, or both, on a day or residential basis;

(b) (1) Provides, and is legally authorized to provide, a program of education beyond secondary education, on a day or residential basis;

(2) Admits as students only persons having a certificate of graduation from a school providing secondary education, or the recognized equivalent of such certificate;

(3) Is accredited by a nationally recognized accrediting agency or association; and

(4) Provides an educational program for which it awards a bachelor's degree or higher degree or provides not less than a two-year program which is acceptable for full credit toward such a degree at any institution which meets the preceding requirements and which provides such a program;

(c) Provides not less than a one-year program of training to prepare students for gainful employment in a recognized occupation and which meets the provisions cited in paragraphs (b) (1), (2) and (3) of this definition; or

(d) Is a local educational agency.

"School facilities" means buildings housing classrooms, laboratories, dormitories, athletic facilities, or related facilities operated in connection with a school.

"Secretary" means the Secretary of the Department of Energy, or his/her designee.

"State" means, in addition to the several States of the Union, the District of Columbia, Puerto Rico, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands and the Virgin Islands.

"State energy agency" means the State agency responsible for developing State energy conservation plans pursuant to section 362 of the Energy Policy and Conservation Act (42 U.S.C. 6322), or, if no such agency exists, a State agency designated by the Governor of such State to prepare and submit the State Plan required under section 394 of the Energy Policy and Conservation Act.

"State hospital facilities agency" means an existing agency which is broadly representative of the public hospitals and the nonprofit hospitals, or, if no such agency exists, an agency designated by the Governor of such State which conforms to the requirements of this definition.

"State school facilities agency" means an existing agency which is broadly representative of public institutions of higher education, nonprofit institutions of higher education, public elementary and secondary schools, nonprofit elementary and secondary schools, public vocational education institutions, nonprofit vocational education institutions, and the interests of handicapped persons in a State or, if no such agency exists, an agency which is designated by the Governor of such state which conforms to the requirements of this definition.

"Technical assistance" means a program or activity for (1) the conduct of specialized studies to identify and specify energy savings and related cost savings that are likely to be realized as a result of modifying maintenance and operating procedures in a building, acquiring and installing one or more specified energy conservation measures in a building, or both; and (2) the planning or administration of such specialized studies. For schools and hospitals which are eligible to receive grants to carry out energy conservation measures, the term also means the planning or administration of specific remodeling, renovation, repair, replacement, or insulation projects related to the installation of energy conservation, or renewable resource measures in a building.

"Unit of local government" means the government of a county, municipality, parish, borough, or township, which is a unit of general purpose government below the State (determined on the basis of the same principles as are used by the Bureau of the Census for general statistical purposes) and the District of Columbia. Such term also means the recognized governing body of an Indian tribe which governing body performs substantial governmental functions and includes libraries which serve all residents of a political subdivision below the State level (such as a community, district or region) free of charge and which derive at least 40 percent of their operating funds from tax revenues of a taxing authority below the State level.

§ 455.3 Administration of grants.

Grants provided under this part shall comply with applicable law, regulation or procedure including, without limitation, the requirements of:

(a) The DOE Financial Assistance Rules (10 CFR Part 600 as amended), except as otherwise provided in this rule;

(b) Executive Order 12372 entitled "Intergovernmental Review of Federal Programs," (48 FR 3130, January 24, 1983), and the DOE regulation implementing this Executive Order entitled "Intergovernmental Review of Department of Energy Programs and Activities" (10 CFR Part 1005);

(c) Office of Management and Budget Circular A-97, entitled "Rules and Regulations Permitting Federal Agencies to Provide Specified or Technical Services to State and Local Units of Government under Title III of the Inter-Governmental Coordination Act of 1968";

(d) DOE regulation entitled "Nondiscrimination in Federally Assisted Programs" (10 CFR part 1040) which implements the following public laws: Title VI of the Civil Rights Act of 1964; section 16 of the Federal Energy Administration Act of 1974; section 401 of the Energy Reorganization Act of 1974; Title IX of the Education Amendments of 1972; The Age Discrimination Act of 1975; and section 504 of the Rehabilitation Act of 1973; and

(e) Such other procedures applicable to this part as DOE may from time to time prescribe for the administration of financial assistance.

§ 455.4 Recordkeeping.

Each State or other entity within a State receiving financial assistance under this part shall make and retain records required and specified by the DOE Financial Assistance Rules, 10 CFR Part 600.

§ 455.5 Suspension and termination of grants.

Suspension and termination procedures shall be as set forth in the DOE Financial Assistance Rules, 10 CFR Part 600.

Subpart B—Preliminary Energy Audit and Energy Audit Grant Procedures

§ 455.10 Purpose and scope.

(a) This subpart contains the regulations whereby the Federal Government shall provide financial assistance for preliminary energy audits and energy audits.

(b) Preliminary energy audits are to be performed by States for the purpose of—

(1) Determining the energy use characteristics of eligible school and hospital facilities, and buildings owned by units of local government and public care institutions, including the size, type, rate of energy use and major energy using systems of such buildings within the State;

(2) Establishing a data base from which reasonably accurate estimates can be made of the number of eligible institutions, the number of qualifying buildings, and patterns of energy conservation needs including an indication of the opportunities for use of renewable energy sources; and

(3) Assisting States in development of a sound and complete State Plan which is a prerequisite to receipt of financial assistance for technical assistance or energy conservation measures, including renewable resource measures.

(c) Energy audits are to be performed by States or eligible schools, hospitals, units of local government and public care institutions for the purpose of—

(1) Determining the energy use characteristics of eligible school and hospital facilities, and buildings owned by units of local government and public care institutions, including the size, type, rate of energy use and major energy using systems of such buildings within the State;

(2) Identifying and encouraging adoption of energy conservation maintenance and operating procedures;

(3) Indicating potential, if any, for acquiring and installing energy conservation measures, including possible use of renewable resources; and

(4) Providing, to the greatest extent practicable, consistent information necessary to identify those buildings to receive priority for additional financial assistance.

§ 455.11 Financial assistance.

(a) DOE shall provide financial assistance from sums appropriated only upon application in accordance with the provisions of this subpart.

(b) The Secretary may make grants for purposes of conducting preliminary energy audits and energy audits of school facilities and hospital facilities.

(c) The Secretary may make grants for purposes of conducting preliminary energy audits and energy audits of buildings owned by units of local government and public care institutions

§ 455.12 Cost sharing.

(a) Amounts made available under this subpart, together with any other amounts made available from other Federal sources, may not be used to pay more than 50 percent of the costs of a preliminary energy audit or an energy audit, except as provided in paragraph (b) of this section.

(b) The Governor of a State may request a grant of up to 100 percent of the costs of any preliminary energy audit or energy audit for schools or hospitals. When financial assistance in excess of the 50 percent cost share limitation is provided to a State, the sum allocated to that State for technical assistance and energy conservation measures, including renewable resource measures shall be reduced by an equal amount. Such funds shall be reallocated among all other States on the same basis as the initial allocation. The Secretary may make such a grant if the State has demonstrated that—

(1) The State would otherwise be unable to participate in the program; and

(2) The amount of the additional financial assistance requested is the minimum necessary to allow the State to participate.

(c) Where a State has expended funds without financial assistance under this subpart for the conduct of preliminary energy audits or energy audits commenced on or after November 9, 1978, the Secretary may, upon application and approval under this subpart, accept all or any portion of such expenditures as constituting State matching funds.

(d) To the extent that funds allocated to a State for preliminary energy audits and energy audits are not needed because all potentially eligible buildings have had or will have an energy audit or its equivalent conducted, such funds may be made available for technical assistance or energy conservation measures. DOE shall, upon request by the State, redistribute funds not needed for preliminary energy audits and energy audits to the State allocation for technical assistance or energy conservation measures, as appropriate, and such funds shall be in addition to those which would otherwise be available for such purposes.

(e) Amounts to be used to meet the cost-sharing requirements described in Subpart C of this part must meet the requirements for cost-sharing set forth in the DOE Financial Assistance Rules, 10 CFR 600.107.

§ 455.13 Allocation of funds.

(a) Financial assistance for conducting preliminary energy audits and energy audits of school facilities and hospital facilities shall be allocated among the

States by multiplying the sum available by the allocation factor (F).

(b) Financial assistance for conducting preliminary energy audits and energy audits of buildings owned by units of local government and public care institutions shall be allocated among the States by multiplying the sum available by the allocation factor (F).

(c) The allocation factor (F) shall be determined by the formula—

$$F = \frac{(.1)}{(n)} + \frac{(.7SP)}{(NP)} + \frac{(.2SC)}{(NC)}$$

where, as determined by DOE—

(1) n is the total number of States;

(2) SP is the population of the State, as determined from 1978 census estimates, "Current Population Reports" Series p–25, number 642, or territory as determined from 1973 census estimates, "Current Population Reports", Series p–25, number 603;

(3) NP is 217,820,000, the total population of all States;

(4) SC is the sum of the State's heating and cooling degree days, as determined from National Oceanic and Atmospheric Administration data for the thirty year period, 1941 through 1970; and

(5) NC is 347,729, the sum of all States' heating and cooling degree days.

(d) Financial assistance allocated to a State pursuant to this subpart for a grant program cycle which remains unobligated at the end of the grant program cycle shall, if available, be reallocated under paragraph (a) or (b) of this section, as appropriate, in the subsequent grant program cycle.

§ 455.14 Submission and review of applications.

(a) To be eligible to receive financial assistance, a State shall complete and submit an original copy of the application to the Secretary. Such application shall be signed by the Governor or his designee.

(b) The first State application shall be submitted not later than 30 days after the effective date of this subpart. Subsequent State applications shall be submitted for each grant program cycle on or before the date established by the Secretary for—

(1) Schools and hospitals;

(2) Buildings owned by units of local government and public care institutions; or

(3) Both.

(c) The State shall consult with representatives of schools, hospitals, units of local government and public care institutions during the preparation of applications for financial assistance for preliminary energy audits and energy audits.

(d) The Governor may request an extension of the submission date for a State's application by sending a written request to the Secretary prior to the date upon which it is due. An extension will only be provided for good cause shown. Such a request shall include a brief discussion of work remaining to be done on the application and time required for its completion. An extension shall not exceed 60 days except where additional time may be required by a State to enact enabling legislation, or where the Secretary finds an additional extension to be consistent with the overall objectives of the Act and the requirements of this subpart.

(e) The Secretary shall review each timely State application and provide financial assistance if the Secretary determines that the application meets the objectives of the Act and the requirements of this part.

(f) All or any portion of an application under this section may be disapproved to the extent that funds are not available under this subpart to carry out such application or portion thereof.

(g) The Secretary shall state in writing the reasons any application is disapproved. Applications not approved by the Secretary may be resubmitted by the applicant at any time within the grant program cycle in the same manner as the original application, and the Secretary shall approve such resubmitted application if it is found to be in compliance with the requirements of this subpart. Amendments of an application shall, except as the Secretary may otherwise provide, be subject to approval in the same manner as the original application.

§ 455.15 Content of applications.

(a) An application shall contain—

(1) The name and mailing address of the proposed State grantee;

(2) A budget which shall include identification of the sources, amounts, and intended use of non-Federal funds required to meet the cost-sharing provisions of § 455.12; and

(3) Assurance that preliminary energy audit and energy audit procedures to be employed will meet the requirements of §§ 455.18 and 455.19.

(b) For each program for which financial assistance is sought, a State application shall also contain—

(1) A timetable, including a listing of milestones for the activities to be carried out by calendar quarters for each program for which financial assistance will be provided;

(2) A description of materials to be developed and adopted, or an identification of existing materials to be used, to meet the requirements for conducting preliminary energy audits and energy audits set forth in §§ 455.18 and 455.19, including provision of data concerning heating degree days, cooling degree days, insolation, and wind speed for regions within the State;

(3) A description of the training to be provided to those persons who will conduct energy audits. Such training shall, at a minimum, use as instructors, architects or engineers who have had practical experience in performing energy audits. The minimum qualifications of those attending the training course, and the minimum qualifications of those who will be permitted to perform energy audits without having attended the training course, shall also be described.

(4) An explanation of how the size of the sample and the selection of sample buildings will be determined in those instances where a sampling methodology is used in the conduct of preliminary energy audits.

(5) A description of the methods which will be used to advise eligible institutions of the availability of assistance under this subpart, and the amounts available by categories of institutions as determined under paragraphs (c)(3) and (d)(2) of this section.

(c) A State application for financial assistance to conduct preliminary energy audits and energy audits of school and hospital facilities shall contain—

(1) A description of the procedures the State will use to provide funding or services to those schools and hospitals which are willing and able to conduct their own energy audits;

(2) A justification for any funding applied for in excess of the 50 percent limit provided in paragraph (a) of § 455.12;

(3) A description of the method by which funds will be apportioned between school facilities and hospital facilities, including a justification for the apportionment if fewer than all such facilities will be audited;

(4) An explanation of the manner in which activities to be conducted shall be consistent with—

(i) Related State programs for educational facilities in such State; and

(ii) State health plans under sections 1524(c)(2) (42 U.S.C. 300m–3; 88 Stat. 2247) and 1603 (42 U.S.C. 300o–2; 88 Stat. 2259) of the Public Health Service Act; and

(5) A description of the actions taken by the State to solicit and consider the views of representatives of schools and hospitals during the preparation of the State's application.

(d) A State application for financial assistance to conduct preliminary energy audits and energy audits of buildings owned by the units of local government and public care institutions shall contain a description of—

(1) The procedures the State will use to provide funding or services to those units of local government and public care institutions which are willing and able to conduct their own energy audits.

(2) The method by which funds will be apportioned between buildings owned by units of local government and public care institutions including a justification for the apportionment if fewer than all these buildings will be audited; and

(3) The action taken by the State to solicit and consider the views of representatives of units of local government and public care institutions during the preparation of the State's application.

(e) A State application shall set forth procedures—

(1) By which buildings or complexes eligible for preliminary energy audits and energy audits will be identified, and a listing thereof prepared and maintained;

(2) For the State to participate, on a selective sampling basis, in the performance of on-site energy audits to assure that the findings present a reasonably thorough and accurate assessment of the buildings surveyed; and

(3) For the State to conduct followup visits, on a selective sampling basis, to ascertain the degree of implementation of energy audit results.

§ 455.16 Use of funds.

(a) A State shall either carry out preliminary energy audits and energy audits of schools and hospitals, or provide for the conduct of such audits by schools and hospitals, through use of funds which the State has received pursuant to paragraph (b) of § 455.11.

(b) A State shall either carry out preliminary energy audits and energy audits of buildings owned by units of local government and public care institutions, or provide for the conduct of such audits by units of local goverment and public care institutions, through the use of funds which the State has received pursuant to paragraph (c) of § 455.11.

(c) No financial assistance provided under this subpart shall be expended for—

(1) The audit of—

(i) A vacant, unused or condemned building;

(ii) A stadium which is part of a school facility used primarily for exhibitions for which admission is charged and which is not also generally used for intramural sports and physical fitness programs generally available to all students; or

(iii) A building or complex owned by a unit of local government or a public care institution—

(A) Not primarily occupied by such institution; or

(B) Which is intended for seasonal use; and

(2) The purchase or acquisition of any single piece of equipment or tangible personal property costing more than $500 to be used in conducting preliminary energy audits or energy audits, unless prior written approval has been obtained from DOE.

(d) Of the financial assistance provided to a State under this subpart, not more than 25 percent shall be expended for—

(1) Administrative expenses;

(2) Development of materials for the conduct of preliminary energy audits and energy audits;

(3) Training of personnel to conduct energy audits;

(4) For conducting preliminary energy audits and sample energy audits; and

(5) For monitoring and evaluation.

(e) At least 75 percent of the financial assistance provided under this subpart shall be used in conducting energy audits of buildings, including costs of personnel attending training sessions conducted by the State preparatory to performing energy audits.

(f) A State may request, and the Secretary may approve, a waiver of the limitations required under paragraph (d) and (e) of this section, provided the State demonstrates that such a waiver would permit the conduct of more energy audits than would otherwise be conducted under the provisions of this section.

§ 455.17 Reporting requirements.

(a) Each State receiving financial assistance under this part shall submit to DOE a quarterly program performance report and a quarterly financial status report. The reports shall be submitted to DOE within 30 days following the end of each calendar quarter.

(b) The quarterly program performance report shall include—

(1) For those building which have received a preliminary energy audit or an energy audit, a summary of the categories, types of ownership, functional uses, gross square feet and energy use levels; and

(2) For those buildings which have received an energy audit—

(i) An estimate of the savings anticipated from energy conservation operation and maintenance procedure changes identified; and

(ii) An approximation of the energy savings indicated from applicable energy conservation measures if the procedure used by the State results in such information or a summary of the number of buildings for which the energy audit indicates potential for energy conservation measures, including renewable resource measures.

(c) The second quarterly report shall also include—

(1) The total sum required for energy audits of buildings whose owners have been advised of selection to receive an energy audit;

(2) A copy of the materials adopted by the State for conducting energy audits;

(3) The apportionment of funds pursuant to paragraphs (c)(3) and (d)(2) of § 455.15 and the data on which such apportionment was based;

(4) The listing of institutions and their buildings compiled pursuant to the provisions of paragraph (e)(1) of § 455.15, summarized by category, types of ownership, and functional use;

(5) Any necessary revisions to the estimate of the characteristics and energy conservation potential of buildings owned by eligible institutions resulting from the sample preliminary energy audits, if a sampling approach was used.

(d) Copies of preliminary energy audit and energy audit reports made by or furnished to the State under § 450.45 of this chapter shall be submitted to DOE together with the quarterly report.

(e) Reports shall contain such other information as may be required by DOE.

§ 455.18 Contents of a preliminary energy audit.

(a) A preliminary energy audit shall provide a description of the building or complex audited and determine its energy-using characteristics, including—

(1) The name or other identification, and address of the building;

(2) A statement that the building meets the requirements of one of the following categories—

(i) A school facility;

(ii) A hospital facility; or

(iii) A building owned and primarily occupied either by offices or agencies of a unit of local government or by a public care institution, neither of which shall include any building intended for seasonal use or any building used primarily by a school or hospital;

(3) A description of the functional use made of the building identifying whether it is a—

(i) School—

(A) Elementary;

(B) Secondary;

(C) College or university;

(D) Vocational;

(E) Other;

(ii) Hospital—

(A) General;

(B) Tuberculosis; or

(C) Other;

(iii) Local government building—

(A) Office;

(B) Storage;

(C) Service;

(D) Library;

(E) Police station;

(F) Fire station; or

(G) Other; or

(iv) Public care building—

(A) Nursing home;

(B) Long term care other than a nursing home;

(C) Rehabilitation facility;

(D) Public health center; or

(E) Residential child care center;

(4) The name and address of the owner of record, indicating whether owned by a public institution, private nonprofit institution or an Indian tribe;

(5) The size of the building, expressed in gross square feet;

(6) The age of the building;

(7) Approximate daily hours of operation, including periods of partial use if applicable;

(8) An indication of whether the building is partially used during vacation periods or other times when the building is not fully utilized, for periods of a week or more, by quarter;

(9) An identification of major energy-using systems, including—

(i) Type of heating system or cooling system or both;

(ii) Fuel used for heating system, cooling system;

(iii) Fuel used for domestic hot water, such as electric or natural gas;

(iv) Special energy using systems, such as food service or laundry; and

(v) Lighting, such as incandescent or fluorescent;

(10) Fuel use in physical units and cost data by type for a preceding 12 month period, by month if practicable, using actual data or an estimate if actual figures are unavailable; and

(11) Total annual energy use expressed in Btu's per gross square foot and energy cost per gross square foot.

(b) A preliminary energy audit shall provide a brief description of activities which have been undertaken to conserve energy in the building or complex being audited, including whether—

(1) A person has been designated to monitor and evaluate energy use;

(2) Work partially or fully satisfying the requirements of an energy audit has been performed;

(3) Detailed studies have been conducted by architects, engineers or architect-engineer teams of energy use and energy conservation; and

(4) Any major energy conservation measures have been implemented, together with a listing of such measures, and estimates of their costs and energy savings if available.

(c) A preliminary energy audit shall provide information regarding site, building, and heating and hot water systems related to renewable resource potential, including—

(1) An indication of whether open land, such as fields, yards and parking areas, is available within the immediate vicinity of the building which is not heavily shaded by tall buildings, trees or other obstructions;

(2) A statement of whether the building is located generally within an urban, suburban or rural area;

(3) An approximation of whether more than half the building's roof area or southern oriented wall surface is heavily shaded by shrubs, trees, buildings or other obstructions for more than about four hours per day;

(4) The number of stories;

(5) A general description of the building's shape, such as square, rectangular, E-shaped, H-shaped or L-shaped;

(6) An indication of whether the roof is flat or pitched, and if pitched whether is has a southern orientation;

(7) Whether there are existing roof-top obstructions, such as chimneys, space conditioning equipment, water towers, mechanical rooms, stairwells or other permanent structures;

(8) An indication of the exterior material of the southern facing wall, such as masonry, wood, aluminum;

(9) An approximation of the proportion of glass area of the southern facing wall, such as less than 25 percent, 25–75 percent, more than 75 percent; and

(10) Location of primary space heating and water heating systems—

(i) Whether outside of or within the building;

(ii) If within the building, whether on the ground floor, in the basement, or on the roof; and

(iii) If within the building, whether centrally located, in multiple units, or a combination thereof.

§ 455.19 Contents of an energy audit.

(a) An energy audit shall contain the information required for a preliminary energy audit, in accordance with § 455.18, and shall also include a description of—

(1) Major changes in functional use or mode of operation planned in the next fifteen years, such as demolition, disposal, rehabilitation, or conversion from office to warehouse;

(2) For a building in excess of 200,000 gross square feet, if available—

(i) Peak electric demand for both daily and annual cycle; and

(ii) Annual energy use by fuel type of the major mechanical or electrical systems if the information is available or can be reasonably estimated;

(3) Terminal heating or cooling, or both, such as radiators, unit ventilators, fancoil units, or double-duct reheat systems;

(4) Building site and structural characteristics related to renewable resource potential, including but not limited to—

(i) Climatic factors, specifically—

(A) Average annual heating degree days and cooling degree days;

(B) Average solar insolation by month;

(C) Average monthly wind speed; and

(ii) Roof characteristics, including—

(A) An identification of primary structural component such as steel, wood, concrete; and

(B) Type of roofing material such as shingles, slate or built-up material; and

(5) A description of general building conditions.

(b) An energy audit shall—

(1) Indicate that appropriate energy conservation maintenance and operating procedures have been implemented for the building, supported by a demonstration based on actual records, that energy use has been reduced in a given year through changes in maintenance and operating procedures, by not less than 20 percent from a corresponding based period having a degree day variance of less than 10 percent; or

(2) Recommended appropriate energy conservation maintenance and operating procedures, on the basis of an on-site inspection and review of any scheduled preventive maintenance plan, together with a general estimate or range of energy and cost savings if practical, which may result from—

(i) Effective operation of ventilation systems and control of infiltration conditions, including—

(A) Repair of caulking or weatherstripping around windows and doors;

(B) Reduction of outside air intake, shutting down ventilation systems in unoccupied areas, and shutting down ventilation systems when the building is not occupied; and

(C) Assuring central or unitary ventilation controls, or both, are operating properly;

(ii) Changes in the operation of heating or cooling systems through—

(A) Lowering or raising indoor temperatures;

(B) Locking thermostats;

(C) Adjusting supply or heat transfer medium temperatures; and

(D) Reducing or eliminating heating or cooling at night or at times when a building or complex is unoccupied;

(iii) Changes in the operation of lighting systems through—

(A) Reducing illumination levels;

(B) Maximizing use of daylight;

(C) Using higher efficiency lamps; and

(D) Reducing or eliminating evening cleaning of buildings;

(iv) Changes in the operation of water systems through—

(A) Repairing leaks;

(B) Reducing the quantity of water used, e.g., flow restrictors;

(C) Lowering settings for hot water temperatures; and

(D) Raising settings for chilled water temperatures; and

(v) Changes in the maintenance and operating procedures of the utility plant and distribution system through—

(A) Cleaning equipment;

(B) Adjusting air/fuel ratio;

(C) Monitoring combustion;

(D) Adjusting fan, motor, or belt drive systems;

(E) Maintaining steam traps; and

(F) Repairing distribution pipe insulation; and

(vi) Such other actions as the State may determine useful or necessary, consistent with the purposes of the energy audit and acceptable cost constraints of § 450.48.

(c) Based on information gathered under paragraphs (a) and (b) of § 455.18, and paragraphs (a) (1) and (2) of this section, an energy audit shall indicate the need, if any, for the acquisition and installation of energy conservation measures and shall include an evaluation of the need and potential for retrofit based on consideration of one or more of the following—

(1) An energy use index or indices, for example, Btu's per gross square foot per year;

(2) An energy cost index or indices, for example, annual energy costs per gross square foot; or

(3) The physical characteristics of the building envelope and major energy-using systems.

(d) Based on information gathered under paragraph (c) of § 455.18 and paragraph (a)(4) of this section, an energy audit shall include an indication of whether building conditions or characteristics present an opportunity for use of solar heating and cooling systems or solar hot water systems.

(e) An energy audit may include an assessment of the estimated costs and energy and cost savings likely to result from the purchase and installation of one or more energy conservation measures.

§ 455.20 Contents of an energy use evaluation.

(a) An energy use evaluation may be used in lieu of an energy audit in cases where no energy audit has been performed, in accordance with § 455.19, and where the State has made provision for such use in its State plan, in accordance with § 455.90(1).

(b) An energy use evaluation shall contain the information required in § 455.18(a) through 455.18(b)(4), and shall also include a description of—

(1) The building's potential suitability for renewable resource applications;

(2) Major changes in functional use or mode of operation planned in the next fifteen years, such as demolition, disposal, rehabilitation, or conversion from office to warehouse;

(3) Appropriate energy conservation maintenance and operating procedures which have been implemented for the building;

(4) The need, if any, for the acquisition and installation of energy conservation measures, including an assessment of the estimated costs and energy and cost savings likely to result from the purchase and installation of one or more energy conservation measures and an evaluation of the need and potential for retrofit based on consideration of one or more of the following:

(i) An energy use index or indices, for example, Btu's per gross square foot per year;

(ii) An energy cost index or indices, for example, annual energy costs per gross square foot; or

(iii) The physical characteristics of the building envelope and major energy-using systems; and

(5) Such other information as the State has determined useful or necessary, in accordance with § 455.90(1)

Subpart C—Technical Assistance Programs for Schools, Hospitals, Units of Local Government and Public Care Institutions

§ 455.40 Purpose and scope.

This subpart specifies what constitutes a technical assistance program eligible for financial assistance under this part, and sets forth the eligibility criteria for schools, hospitals, units of local government and public care institutions to receive grants for technical assistance to be performed in buildings owned by such institutions.

§ 455.41 Eligibility.

To be eligible to receive financial assistance for a technical assistance program, an applicant must—

(a) Be a school, hospital, unit of local government, public care institution or coordinating agency, all as defined in § 455.2, except that—

(1) Financial assistance for units of local government and public care institutions will be provided only for buildings which are owned and primarily occupied by offices or agencies of a unit of local government or public care institution and which are not intended for seasonal use and not utilized primarily as a school or hospital eligible for assistance under this program; and

(2) Financial assistance provided to a school which is a local education agency as defined in § 455.2 must not be used for a technical assistance program or acquisition or installation of any energy conservation measure in any building of such agency which is used principally for administration.

(b) Be located in a State which has an approved State Plan as described in Subpart H of this part;

(c) Have conducted an energy audit, its equivalent or an energy use evaluation for the building for which financial assistance is to be requested, subsequent to the most recent construction, reconfiguration or utilization change which significantly modified energy use within the building;

(d) Give assurance that it has implemented all energy conservation maintenance and operating procedures identified as a result of the energy audit or its equivalent, identified in the energy use evaluation, or provide a written justification satisfactory to the Secretary, pursuant to § 455.90(j); and

(e) Submit an application in accordance with the provisions of this part and the approved State Plan.

§ 455.42 Contents of program.

(a) The purpose of a technical assistance program is to provide a report which meets the requirements of this section and the State's procedures for implementing this section. A technical assistance program should be designed—

(1) To identify and document energy conservation maintenance and operating procedure changes and energy conservation measures in sufficient detail to support possible application for financial assistance, and to provide reviewers and decisionmakers handling such applications sufficient information upon which to base judgments as to their reasonableness; and

(2) To provide the institution with a description of its current characteristics, procedures, operating and maintenance procedure changes and potential for cost-effective capital improvements such that the report can be used to guide those responsible for the energy and financial management of the institution in implementing energy conservation actions without regard to possible financial assistance under this program.

(b) A technical assistance program shall be conducted by a technical assistance analyst, who has the qualifications established in the State Plan in accordance with § 455.90(p) and who shall consider all feasible energy conservation operating and maintenance procedure changes and energy conservation measures for a building, including renewable resource measures. A technical assistance program shall identify the estimated costs of, and the energy and cost savings likely to be realized from, implementing energy conservation maintenance and operating procedures. A technical assistance program shall also provide a detailed engineering analysis to specify the estimated cost of, and the energy and cost savings likely to be realized from, acquiring and installing each energy conservation measure, including renewable resource measures, that indicate a significant potential for saving energy based upon the technical assistance analyst's initial consideration.

(c) The technical assistance analyst shall use the following factors in calculating costs—

(1) Current prices, including demand charges.

(2) Marginal prices where incremental prices apply.

(d) At the conclusion of a technical assistance program, the technical assistance analyst shall prepare a report which shall include—

(1) A description of building characteristics and energy data including—

(i) The results of the energy audit, its equivalent, or energy use evaluation of the building, together with a statement as to the accuracy of the energy audit data as required in § 455.42(d)(7), and completeness of the energy audit recommendations;

(ii) The operation characteristics of energy using systems; and

(iii) The estimated remaining useful life of the buildings;

(2) An analysis of the estimated energy consumption of the building, by fuel type in total Btu's and Btu/sq. ft./yr. using conversion factors prescribed by the State, at optimum efficiency (assuming implementation of all energy conservation maintenance and operating procedures);

(3) An evaluation of the building's potential for renewable resource conversions; including water heating systems;

(4) A listing of any known local zoning ordinances and building codes which may restrict the installation of solar or renewable resource systems;

(5) A description and analysis of all identified operating and maintenance procedures changes, if any, and energy conservation measures, including renewable resource measures, setting forth—

(i) A description of each operating and maintenance procedure change and an estimate of the costs of adopting such operating and maintenance procedure changes;

(ii) An estimate of the cost of design, acquisition and installation of each energy conservation measure, discussing pertinent assumptions as necessary;

(iii) Estimated useful life of each energy conservation measure;

(iv) An estimate of increases or decreases in maintenance and operating costs that would result from each conservation measure if any;

(v) An estimate of the salvage value or disposal cost of each energy conservation measure at the end of its useful life, if any;

(vi) An estimate supported by all data and assumptions used in arriving at the estimate, of the annual energy and energy cost savings (using current energy prices including demand charges) expected from each operating and maintenance procedure change and the acquisition and installation of each energy conservation measure. In calculating the potential energy cost savings or energy savings of each energy conservation measure, including renewable resource measures, the technical assistance analyst shall—

(A) Assume that all energy savings obtained from energy conservation maintenance and operating procedures have been realized;

(B) Calculate the total energy and energy cost savings, by fuel type, expected to result from the acquisition and installation of all feasible energy conservation measures, taking into account the interaction among the various measures;

(C) Calculate that portion of the total energy and energy costs savings, as determined in paragraph (d)(5)(vi)(B) of this section attributable to each individual energy conservation measure; and

(D) Consider climatic and other variables;

(vii) The simple payback period of each energy conservation measure, taking into account the interactions among the various measures. The simple payback period is calculated by dividing the estimated total cost of the measure, as determined pursuant to § 455.42(d)(5)(ii), by the estimated annual cost saving accruing from the measure, as determined pursuant to § 455.42(d)(5)(vi). For the purposes of ranking applications, the simple payback period shall be calculated using the cost savings resulting from energy savings only, determined on the basis of current energy prices except:

(A) For energy conservation measures which result in conversion from oil, natural gas, other petroleum products or electricity to coal, the simple payback period shall be calculated based on the annual cost savings (using current energy prices) associated with the change in fuels; or

(B) For renewable resource energy conservation measures, the simple payback period shall be calculated using the cost of the fuels displaced (using current energy prices) as the annual cost savings; and

(viii) The estimated cost of the measure which shall be the total cost for design and other professional service (excluding cost of a technical assistance program), if any, and acquisition and installation costs. At the request of the applicant, the technical assistance report shall provide a life cycle cost analysis, which considers all costs and cost savings, such as maintenance costs and/or savings, resulting from an energy conservation measure for use by the institution.

(6) Energy use and cost data, actual or estimated, for each fuel type used for the prior 12-month period, by month if possible; and

(7) A signed and dated certification that the technical assistance program has been conducted in accordance with the requirements of this section and that the data presented is accurate to the best of the technical assistance analyst's knowledge.

Subpart D—Energy Conservation Measures for Schools and Hospitals

§ 455.50 Purpose and scope.

This subpart indicates what constitutes an energy conservation measure that may receive financial assistance under this part and sets forth the eligibility criteria for schools and hospitals to receive grants for energy conservation measures, including renewable resource measures.

§ 455.51 Eligibility.

(a) To be eligible to receive financial assistance for an energy conservation measure, including renewable resource measures, an applicant must—

(1) Be a school, hospital or coordinating agency as defined in § 455.2, provided that financial assistance provided to a school which is a local education agency as defined in § 455.2 must not be used for a technical assistance program or acquisition or installation of any energy conservation measure in any building of such agency which is used principally for administration;

(2) Be located in a State which has an approved State Plan as described in Subpart H of this part;

(3) Have completed a technical assistance program or its equivalent, as determined by the State in accordance with the State Plan, for the building for which financial assistance is to be requested, subsequent to the most recent construction, reconfiguration or utilization change to the building which significantly modified energy use within the building;

(4) Have implemented all energy conservation maintenance and operating procedures which are identified as the result of a technical assistance program, or have provided a satisfactory written justification for not implementing any specific maintenance and operating procedures so identified, as described in §455.90(j).

(5) Have no plan or intention at the time of application to close or otherwise dispose of the building for which financial assistance is to be requested within the simple payback period of any energy conservation measure recommended for that building; and

(6) Submit an application in accordance with the provisions of this part and the approved State Plan.

(b) To be eligible for financial assistance, the simple payback period of each energy conservation measure for which financial assistance is requested shall not be less than 2 years nor greater than 10 years, and the estimated useful life of the measure shall be greater than its simple payback period.

§ 455.52 Contents of program.

The programs to be funded under this part will be for the design, acquisition and installation of energy conservation measures to reduce energy consumption or measures to allow the use of solar or other alternative energy resources for schools and hospitals. Such measures include, but are not necessarily limited to those included in the definition of "energy conservation measures" in §455.2.

Subpart E—Applicant Responsibilities

§ 455.60 Grant application submittals.

(a) Each eligible applicant desiring to receive financial assistance shall file an application in accordance with the provisions of this subpart and the approved State Plan of the State in which such building is located. The application, which may be amended in accordance with applicable State procedures at any time prior to the State's final determination thereon, shall be filed with the State energy agency designated in the State Plan.

(b) Applications from schools, hospitals, units of local government, public care institutions and coordinating agencies for financial assistance for technical assistance programs shall include the certifications contained in § 455.61 and—

(1) The applicant's name and mailing address;

(2) The energy audit, its equivalent, or an energy use evaluation (as determined by the State) for each building for which financial assistance is requested;

(3) A project budget, by building, which stipulates the intended use of all Federal and non-Federal funds; including in-kind contributions (valued in accordance with the guidelines in 10 CFR 600.107(e)), to be used to meet the cost sharing requirements described in Subpart C of this part;

(4) A brief description, by building, of the proposed technical assistance program, including a schedule, with appropriate milestone dates, for completing the technical assistance program; and

(5) Additional information required by the applicable State Plan, and any other information which the applicant desires to have considered, such as information to support an application from a school or hospital for financial assistance in excess of the 50 percent Federal share on the basis of severe hardship or an application which proposes the use of Federal funds, paid under and authorized by another Federal agreement, to meet cost sharing requirements.

(c) Applications from schools and hospitals and coordinating agencies for financial assistance for energy conservation measures, including renewable resource measures, shall include the certifications contained in § 455.61 and—

(1) The applicant's name and mailing address;

(2) Identification of each building pursuant to § 455.18(a) (1) through (5), or an equivalent identification if no preliminary energy audit was performed, for which financial assistance is requested, including—

(i) Name or other identification of each building and its address;

(ii) Building category;

(iii) Description of functional use;

(iv) Ownership; and

(v) Size of building expressed in gross square feet.

(3) A project budget, by measure or by building as provided in the State Plan, which stipulates the intended use of all Federal and non-Federal funds, and identifies the sources and amounts of non-Federal funds, including in-kind contributions (valued in accordance with the guidelines in 10 CFR 600.107(e)) to be used to meet the cost sharing requirements described in Subpart C of this part;

(4) A schedule, including appropriate milestone dates, for the completion of the design, acquisition and installation of the proposed energy conservation measures for each building;

(5) For each energy conservation measure proposed for funding, the projected cost, and the projected simple payback period as contained in § 455.42(d)(5) (vii) and (viii). Applications with more than one energy conservation measure per building shall include projected costs and paybacks for each measure, and the average simple payback period for all measures proposed for the building;

(6) Unless waived by DOE, the report of the technical assistance analyst. This report must have been completed since the most recent construction, reconfiguration or utilization change to the building, which significantly modified energy use, for each building.

(7) If the applicant is aware of any adverse environmental impact which may arise from adoption of any energy conservation measure, and analysis of that impact and the applicant's plan to minimize or avoid such impact; and

(8) Additional information required by the applicable State Plan, and any additional information which the applicant desires to have considered, such as information to support an application for financial assistance in excess of the 50 percent Federal share on the basis of severe hardship, or an application which proposes the use of Federal funds, paid under and authorized by another Federal agreement, to meet cost sharing requirements.

§ 455.61 Applicant certifications.

Applications for financial assistance for technical assistance programs and energy conservation measures, including renewable resource measures, shall include certification that the applicant—

(a) Is eligible under § 455.41 for technical assistance or § 455.51 for energy conservation measures;

(b) Has satisified the requirements set forth in § 455.60;

(c) For applications for technical assistance, has implemented all energy conservation maintenance and operating procedures recommended as a result of the energy audit, its equivalent, or identified in the energy use evaluation, and for applications for energy conservation measures, those recommended in the report obtained under a technical assistance program. If any such procedure has not been implemented, the application shall contain a satisfactory written justification for not implementing that procedure as prescribed pursuant to § 455.90(j);

(d) Will obtain from the technical assistance analyst, before the analyst performs any work in connection with a technical assistance program or energy conservation measure, a signed statement certifying that the technical assistance analyst has no conflicting financial interests and is otherwise qualified to perform the duties of technical assistance analyst in accordance with the standards and criteria established in the approved State Plan;

(e) For a project under this Part having a total estimated cost of more than $5,000, any construction contract or subcontract in excess of $2,000 using any grant funds awarded under this part must include those contract labor standards provisions set forth in 29 CFR 5.5 and a provision for payment of laborers and mechanics at the minimum wage rates determined by the Secretary of Labor in accordance with the Davis-Bacon Act (40 U.S.C. 276a) as set forth in 29 CFR Part 1. For the purpose of this section "project" means an undertaking to acquire and install one or more energy conservation measures in a building which is eligible under this part; and

(f) Will comply with all reporting requirements contained in § 455.63.

§ 455.62 Grant applications for State administrative expenses.

(a) Each State desiring to receive grants to help defray State administrative expenses shall file an application in accordance with the provisions of this section. At any time after notice by DOE of the amounts allocated to each State for a grant program cycle, each State may apply to the Secretary for an amount for administrative expenses not exceeding $30,000 or 2 percent of its total allocation for technical assistance and energy conservation measures, whichever is higher. In addition, each State, after it makes the submittal to DOE required under § 455.72, may apply for a further grant not exceeding 5 percent of the total of all grant awards for technical assistance and energy conservation measures within that State in that grant program cycle, less any amounts previously awarded the State for administrative expenses in the same grant program cycle. In the event that a State cannot or decides not to use the amount available to it for an administrative grant under this section for administrative purposes, these funds may, at the discretion of the State, be used for technical assistance and energy conservation grants to eligible institutions within that State, in accordance with this part.

(b) Applications for financial assistance to defray State administrative expenses shall include—

(1) The name and address of the person designated by the State to be responsible for the State's functions under this part;

(2) An identification of intended use of all Federal and non-Federal funds, for the State administrative expenses listed in § 455.83(c) and a list of the sources and amounts of the required matching non-Federal funds, including in-kind contributions valued in accordance with the guidelines in the DOE Financial Assistance Rules (10 CFR 600.107(e)) to be used to meet the cost-sharing requirements described in Subpart G of this part; and

(3) Any other information required by DOE.

§ 455.63 Grantee records and reports.

(a) Each State, school, hospital, unit of local government, public care institution and coordinating agency which receives a grant for a technical assistance program, energy conservation measure, including renewable resource measures, or State administrative expenses shall keep all the records required by § 455.4 in accordance with DOE Financial Assistance Rules.

(b) Each grantee shall submit reports as follows—

(1) For technical assistance projects, two copies of a final report of the analysis completed on each building for which financial assistance was provided shall be submitted to the State energy agency no later than 90 days following completion of the analysis. These reports shall contain—

(i) The report submitted to the institution by the technical assistance analyst, and

(ii) The institution's plan to implement energy conservation maintenance and operating procedures.

(2) For energy conservation measure projects—

(i) Grantee shall submit semi-annual progress reports. Two copies shall be submitted to the State energy agency no later than the end of July and January and shall detail and discuss milestones accomplished, those not accomplished, status of in-progress activities, and remedial actions if needed to achieve project objectives. A final report may be submitted in lieu of the last semi-annual report if it satisfies the semi-annual progress report and final report designated time frames;

(ii) Grantees shall submit a final report. Two copies shall be submitted to the State within 90 days of the completion of the project and shall list and describe the energy conservation measures acquired and installed, contain a final estimated simple payback period for each measure and the project as a whole, and include a statement that the completed energy conservation measures conform to the approved grant application.

(iii) Grantees shall submit annual energy use reports. Two copies shall be submitted to the State within 60 days of the close of each 12-month period following project completion for a period of three years, or for the life of this Federal program, whichever is shorter, and shall identify each building and provide data on energy use for that building for the preceding 12-month period.

(3) For State administrative grants, each State shall submit a semi-annual program performance report to DOE by the close of each February and August. The report will provide:

(i) A discussion of administrative activities pursuant to § 455.83(c), and a discussion of milestones accomplished, those not accomplished, status of in-progress activities, problems encountered, and remedial actions, if any, planned pursuant to § 455.73(f);

(ii) A summary of grantee reports received by the State during the report period pursuant to paragraphs (b)(1) and (b)(2) of this section; and

(iii) For the report due to be submitted to DOE by the close of each August, an estimate of annual energy use reductions in the State, by energy source, attributable to implementation of energy conservation maintenance and operating procedure and installation of energy conservation measures under this program. Such estimates shall be based upon a sampling of institutions participating in the technical assistance phase of this program and upon the reports submitted to the State pursuant to paragraph (b)(2)(iii) of this section.

(4) Such other information as the Secretary may, from time to time request.

(5) Each copy of any technical assistance, energy conservation measures, or State administrative report shall be accomplished by a financial status report completed in accordance with the documents listed in § 455.3. A financial status report shall not be required for annual reports submitted pursuant to paragraph (b)(2)(iii) of this section. In addition, States shall file quarterly financial status reports for the quarters which occurs between the semi-annual report periods covered in their program performance reports. These quarterly reports are due within 30 days following the end of the applicable quarters.

(6) Grantee technical assistance, energy conservation measure, and financial status reports submitted to the State shall be submitted by the State to DOE as required by the Secretary.

Subpart F—State Responsibilities

§ 455.70 State evaluation of grant applications.

(a) If an application received by a State is reviewed and evaluated by that State and determined to be in compliance with Subparts C, D and E of this part, § 455.70(b), any additional requirements of the approved State Plan, State environmental laws, and other applicable laws and regulations, then such application will be eligible for financial assistance.

(b) Concurrently with its evaluation and ranking of grant applications pursuant to § 455.71, the State will forward applications for technical assistance or for energy conservation measures for a school or hospital to the State school facilities agency or the State hospital facilities agency, as the case may be, for review and certification that each school application is consistent with related State programs for educational facilities, and each hospital application is consistent with State health plans under sections 1524(c)(2) and 1603 of the Public Health Service Act (42 U.S.C. 300m-3 and 300o-2, respectively), and that each has been coordinated through abbreviated review mechanisms under section 1523 of the Public Health Service Act (42 U.S.C. 300m-2) and section 1122 of the Social Security Act. No application from a school or hospital shall be eligible for funding until such certification has been issued.

§ 455.71 State ranking of grant applications.

All eligible applications received by the State will be ranked by the State in accordance with its approved State Plan.

(a) For technical assistance programs, buildings shall be ranked in descending priority based upon the energy conservation potential of the building as determined from an energy audit, its equivalent, or an energy use evaluation if an energy audit has not been performed, in accordance with the procedures established in the State Plan and one or more of the methods indicated in § 455.19(c) or § 455.20(d). In the case of buildings having equivalent energy conservation potential, preference shall be given to those buildings which have completed an energy audit or evaluation without the use of Federal funds. Each State shall develop separate rankings for all buildings covered by eligible applications for—

(1) Technical assistance programs for units of local government and public care institutions, and

(2) Technical assistance programs for schools and hospitals.

(b) All eligible applications for energy conservation measures received will be ranked by the State on an individual building-by-building or a measure-by-measure basis. Several buildings may be ranked as a single building if the application proposes a single energy conservation measure which directly involves all of the buildings. Buildings or measures shall be ranked in accordance with the procedures established by the State Plan, on the basis of the information developed during a technical assistance program (or its equivalent) for the building and the criteria for ranking applications, which are listed below in the descending order in which weights for each criterion are to be applied by the State—

(1) Payback, calculated in accordance with § 455.42(d)(5)(vii);

(2) The types of energy sources to which conversion is proposed, including in descending priority—

(i) Renewable; and

(ii) Coal;

(3) The types and quantities of energy to be saved, including oil, natural gas, or electricity, in a priority as established in the approved State Plan;

(4) The quality of the technical assistance program report; and

(5) Other factors as determined by the State.

(c) A State is exempt from the ranking requirements of this section when—

(1) The total amount requested by all applications for schools and hospitals for technical assistance and energy conservation measures in a given grant program cycle for grants up to 50 percent is less than or equal to the funds available to the State for such grants and the total amount recommended for hardship funding is less than or equal to the amounts available to the State for such grants.

(2) The total amount requested by all applications for buildings owned by units of local government and public care institutions in a given grant program cycle is less than or equal to the total amount allocated to the State for technical assistance program grants in the State.

(d) Within the rankings of school and hospital buildings for technical assistance and energy conservation measures, including renewable resource measures, to the extent that approvable applications are submitted, a State shall initially assure that—

(1) Schools receive at least 30 percent of the total funds allocated for schools and hospitals to the State in any grant program cycle; and

(2) Hospitals receive at least 30 percent of the total funds allocated for schools and hospitals to the State in any grant program cycle.

(e) To the extent provided in § 455.100(d), financial assistance will be initially available for schools and hospitals experiancing severe hardship based upon an applicant's long-term need or inability to provide the 50 percent non-Federal share. This financial assistance will be available only to the extent necessary to enable such institutions to participate in the program.

(1) The State shall recommend funds for severe hardship applications wholly or partially from the funds reserved in accordance with § 455.100(d) and as stated in an approved State Plan.

(2) Applications for Federal funding in excess of 50 percent based on claims of severe hardship shall be given an additional evaluation by the State to assess on a quantifiable basis, to the maximum extent practicable, the relative need among eligible institutions. The minimum amount of additional Federal funding necessary for the applicant to participate in the program will be determined by the State in accordance with the procedures established in the State Plan and will be based upon one or more of the following—

(i) The ratio of the cost of the proposed technical assistance programs or energy conservation measures to the institution's total annual budget;

(ii) The borrowing capacity of the institution;

(iii) The average unemployment rate for the institution's locality at the time the application is submitted;

(iv) The ratio of the amount expended annually by the institution for energy to the institution's total annual operating budget;

(v) The median annual family income of the institution's locality; and

(vi) Other special conditions of the institution or its locality as determined by the State.

(3) A State shall indicate, for those schools and hospitals with the highest rankings, determined pursuant to paragraphs (a) and (b) of this section—

(i) The amount of additional hardship funding requested by each eligible applicant for each building determined to be in a class of severe hardship; and

(ii) The amount of hardship funding recommended by the State based upon relative need as determined in accordance with the State Plan, to the limit of the hardship funds available.

(f) Only schools, hospitals, and hardship applicants shall be recommended for funding from the appropriate allocation specified in paragraphs (d) and (e) of this section, unless after the State deadline for submitting applications has passed, there are insufficient applications meeting the requirements of paragraphs (d) and (e) of this section and otherwise qualifying for funding under this part, in which case the State may recommend use of the remaining funds in those allocations to fund applications under this part without regard to the limitations of paragraphs (d) and (e) of this section.

§ 455.72 Forwarding of applications.

(a) Each State shall forward all applications recommended for funding within its allocation to the Secretary once each grant program cycle along with a listing of buildings or measures covered by eligible applications for schools, hospitals, units of local government and public care institutions, and ranked by the State pursuant to the provisions of § 455.71. If ranking has been employed the list shall include the standings of buildings or measures.

(1) Measure by measure rankings will be recombined for the respective building with more than one recommended measure.

(2) Buildings will be consolidated under one grantee application.

(b) The State shall indicate the amount of financial assistance requested by the applicant for each eligible building and, for those buildings recommended for funding within the limits of the State's allocation, the amount recommended for funding. If the amount recommended is less than the amount requested by the applicant, the list shall also indicate the reason for that recommendation.

(c) States shall certify applications submitted are eligible pursuant to § 455.70(a).

§ 455.73 State liaison, monitoring and reporting.

Each State shall be responsible for—

(a) Consulting with eligible institutions and coordinating agencies representing such institutions in the development of its State Plan;

(b) Notifying eligible institutions and coordinating agencies of the content of the approved State Plan and any amendment to a State Plan;

(c) Notifying each applicant how the applicant's building or measure ranked among other applications, and whether and to what extent its application will be recommended for funding or, if not to be recommended for funding, the specific reason(s) therefor;

(d) Certifying that each institution has given its assurance that it is willing and able to participate on the basis of any changes in amounts recommended for that institution in the State ranking pursuant to § 455.71;

(e) Reporting requirements pursuant to § 455.63(b)(3); and

(f) Direct program oversight and monitoring of the activities for which grants are awarded as defined in the State Plan. States shall immediately notify the Secretary of any non-compliance or indication thereof.

Subpart G—Grant Awards

§ 455.80 Approval of grant applications.

(a) The Secretary shall review and approve applications submitted by a State in accordance with § 455.72 if the Secretary determines that the applications meet the objectives of the Act, and comply with the applicable State Plan and the requirements of this part. The Secretary may disapprove all or any portion of an application to the extent funds are not available to carry out a program or measure (or portion thereof) contained in the application, or for such other reason as the Secretary may deem appropriate.

(b) The Secretary shall notify a State and the applicant of the final approval or disapproval of an application at the earliest practicable date after the Secretary's receipt of the application, and, in the event of disapproval, shall include a statement of the reasons therefor.

(c) An application which has been disapproved for reasons other than lack of funds may be amended to correct the cause of its disapproval and resubmitted in the same manner as the original application at any time within the same grant program cycle. Such an application will be considered to the extent funds have not already been designated for institutions by the ranking process at the time of resubmittal. However, nothing in this provision shall obligate either the State or the Secretary to take final action regarding a resubmitted application within the grant program cycle. An application not acted upon may be resubmitted in a subsequent grant program cycle.

(d) The Secretary shall not provide supplemental funds beyond those awarded for technical assistance projects and shall fund only one technical assistance project per building.

(e) The Secretary shall not provide supplemental funds beyond those awarded for all energy conservation measures funded under a grant in a given grant program cycle. An institution may apply for, and the Secretary may make, grant awards in another grant program cycle for energy conservation measures for which financial assistance was not previously and specifically provided, even though the measures relate to a building which previously received grants for other energy conservation measures.

(f) The Secretary may fund costs incurred by an institution for technical assistance and energy conservation measure projects after the date of the grant application, so long as that date is no earlier than the close of the preceding grant program cycle. Such costs may be funded when, in the judgment of the Secretary, the institution has complied with program requirements and the costs incurred are allowable under applicable cost principles and the approved project budget. The applicant bears the responsibility for the entire project cost unless the application is approved by the Secretary in accordance with this part.

(g) In addition to the prior approval requirements for project changes as specified in the DOE Financial Assistance Rules (10 CFR 600.114(c)), a grantee shall request prior written approval from DOE before—

(1) Transferring DOE or matching amounts between buildings included in an approved application when the State ranks applications on a building-by-building basis, or

(2) Transferring DOE or matching amounts between energy conservation

measures included in an approved application when the State ranks on a measure-by-measure basis.

§ 455.81 Grant awards for units of local government and public care institutions.

(a) The Secretary may make grants to units of local government, public care institutions and coordinating agencies for up to 50 percent of the costs of performing technical assistance programs for buildings covered by an application approved in accordance with § 455.80; except that in the case of units of local government and public care institutions a majority of whose operating and capital funds are provided by the government of the Virgin Islands, Guam, American Samoa, or the Commonwealth of Northern Mariana Islands, a grant may be made for up to 100 percent of such costs.

(b) Total grant awards within any State to units of local government and public care institutions are limited to funds allocated to each State in accordance with Subpart I of this part.

(c) Units of local government and public care institutions are not eligible for financial assistance for severe hardship.

(d) No grant awarded under this section for a technical assistance program shall include funding for the purchase of any single item of equipment or tangible personal property having an acquisition cost in excess of $500.

§455.82 Grant awards for schools and hospitals.

(a) The Secretary may make grants to schools, hospitals and coordinating agencies for up to 50 percent of the costs of performing technical assistance programs for buildings covered by an application approved in accordance with § 455.80; except that in the case of schools and hospitals a majority of whose operating and capital funds are provided by the government of the Virgin Islands, Guam, American Samoa, or the Commonwealth of the Northern Mariana Islands a grant may be made for up to 100 percent of such costs. Grant awards for technical assistance programs in any State within any grant program cycle shall be limited to a portion of the total allocation as specified in the Subpart I.

(b) The Secretary may make grants to schools, hospitals and coordinating agencies for up to 50 percent of the costs of acquiring and installing energy conservation measures, including renewable resource measures, for buildings covered by an application approved in accordance with § 455.80; except that in the case of schools and hospitals a majority of whose operating and capital funds are provided by the government of the Virgin Islands, Guam, American Samoa, or the Commonwealth of the Northern Mariana Islands, a grant may be made for up to 100 percent of such costs.

(c) The Secretary may award up to 10 percent of the total amount allocated to a State for schools and hospitals in a case of severe hardship, ascertained by the State in accordance with the State Plan, for buildings recommended and in amounts determined by the State pursuant to §455.71(e).

(d) No grant awarded under this section for a technical assistance program shall include funding for the purchase of any single item of equipment or other tangible personal property having an acquisition cost in excess of $500.

(e) Applicant expenditures for a technical assistance program or installation or one of more energy conservation measures commenced after November 8, 1978 for a building may be wholly or partially credited, in the discretion of the Secretary, toward meeting the matching non-Federal funds requirement for a grant for additional energy conservation measures in the same building. Credit will be considered only when the projects for which credit is sought meet program requirements, except that the project need not comply with the Davis-Bacon Act regarding labor standards or wage rates. Credit for energy conservation measures will be considered only when supported by a technical assistance analysis performed prior to the installation of the energy conservation measures. Applications for credit for completed or partially completed energy conservation measures will be considered in conjunction with applications for additional energy conservation measures. The application shall reflect both the work done and the work to be done and will be reviewed and ranked on that basis. In no case shall the credit exceed an amount equal to the non-Federal share of the proposed additional energy conservation measures.

§ 455.83 Grant awards for State administrative expenses.

(a) For the purpose of defraying State expenses in the administration of technical assistance programs in accordance with Subpart C and energy conservation measures in accordance with Subpart D, the Secretary may make grant awards to a State—

(1) Immediately following public notice of the amounts allocated to a State for the grant program cycle, and upon approval of the application for administrative costs, in an amount not exceeding $30,000 or 2 percent of that State's allocation for a given grant program cycle for technical assistance and energy conservation measures, whichever is higher. Grants for such purposes may be made for up to 50 percent of a State's projected administrative expenses, or in the case of grants to the Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands, for up to 100 percent of the projected administrative expenses, as approved by the Secretary; and

(2) Concurrently with grant awards for approved applications for technical assistance or energy conservation measures for institutions in that State, and upon approval of an application for administrative costs, in an amount not exceeding the difference between the amount granted pursuant to paragraph (a)(1) of this section and 5 percent of the total amount of grants awarded within the State for technical assistance programs and energy conservation measures in the applicable grant program cycle. Grants for such purposes may be made for up to 50 percent of a State's projected administrative expenses or in the case of grants to the Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands, for up to 100 percent of the projected administrative expenses, as approved by the Secretary. The total of all grants for State administrative costs, technical assistance programs and energy conservation measures in that State shall not exceed the total amount allocated for that State for any grant program cycle.

(b) In the event that a State cannot or decides not to use the amount available to it for an administrative grant under this section for administrative purposes, these funds may, at the discretion of the State, be used for technical assistance and energy conservation grants to eligible institutions within that State in accordance with this part.

(c) A State's administrative expenses shall be limited to those directly related to administration of technical assistance programs and energy conservation measures including costs associated with—

(1) Personnel, whose time is expended directly in support of such administration;

(2) Supplies, and services, expended directly in support of such administration;

(3) Equipment purchased or acquired solely for, and utilized directly in support of such administration, provided that no single item of equipment or other

tangible personal property costing more than $500 shall be acquired without the prior written approval of DOE;

(4) Printing, directly in support of such administration; and

(5) Travel, directly related to such administration.

Subpart H—State Plan Development and Approval

§ 455.90 Contents of State plan.

Each State shall develop a State Plan for technical assistance programs and energy conservation measures, including renewable resource measures. The State Plan shall include—

(a) A statement setting forth the procedures by which the views of eligible institutions or coordinating agencies representing such institutions, or both, were solicited and considered during development of the State Plan, and any amendment to a State Plan;

(b) The procedures the State will follow to notify eligible institutions and coordinating agencies of the content of the approved State Plan, or any approved amendment to a State Plan;

(c) The procedures for submittal of grant applications to the State;

(d) A description and evaluation of the results of preliminary energy audits (described in Subpart B of this part) which have been conducted in the State including, but not limited to—

(1) In the case of a State which has completed preliminary energy audits of all potentially eligible buildings, a summary of the data gathered pursuant to §455.18 for all such buildings;

(2) In the case of a State which has completed preliminary energy audits of a sample of all potentially eligible buildings within the State—

(i) Reasonably accurate estimates of the preliminary energy audit data required by § 455.18 for all potentially eligible buildings within the State; and

(ii) A plan which describes further actions to be taken to complete preliminary energy audits of all potentially eligible buildings;

(e) The procedures to be used by the State for evaluating and ranking technical assistance and energy conservation measure grant applications pursuant to § 455.71, including the weights assigned to each criterion set forth in § 455.71(b). In addition, the State shall determine the order of priority given to fuel types that include oil, natural gas, and electricity, under § 455.71(b)(3).

(f) The procedures that the State will follow to insure that funds will be allocated equitably among eligible applicants within the State, including procedures to insure that funds will not be allocated on the basis of size or type of institution but rather on the basis of relative need taking into account such factors as cost, energy consumption and energy savings, in accordance with § 455.71;

(g) The procedures that the States will follow for identifying schools and hospitals experiencing severe hardship and for apportioning the funds that are available for schools and hospitals in a case of severe hardship. Such policies and procedures shall be in accordance with § 455.71(e);

(h) A statement setting forth the extent to which, and by which methods, the State will encourage utilization of solar space heating, cooling and electric systems and solar water heating systems;

(i) The procedures to assure that all financial assistance under this part will be expended in compliance with the requirements of the State Plan, in compliance with the requirements of this part, and in coordination with other State and Federal energy conservation programs;

(j) The procedures to insure implementation of energy conservation maintenance and operating procedures in those buildings for which financial assistance is requested under this part. At a minimum, the plan shall provide all maintenance and operating procedure changes recommended in an energy audit report, the equivalent of an energy audit report, an energy use evaluation, a technical assistance report, or a combination of these that have been implemented as provided under this part. An assurance that the maintenance and operating procedures will be implemented in the future, or a justification for not implementing such a procedure, as appropriate, may be acceptable in lieu of implementation if it is shown that—

(1) The recommendation is infeasible because of factors not considered by the auditor or analyst;

(2) There is a cost involved which exceeds the institution's limit in operating expenditures, provided it is shown a budget request has been made to implement the recommendation, and assurance is given that the change will be effected at some specified future date;

(3) The implementation of the change requires some item of supply or material which is not presently available; or

(4) Other factors subject to approval by the Secretary on a case-by-case basis;

(k) The procedures designed to insure that financial assistance under this part will be used to supplement, and not to supplant, State, local or other funds;

(l) The circumstances under which the State will accept an energy use evaluation in lieu of an energy audit, and the information the State will require to be contained in that evaluation;

(m) The procedures for determining that energy audits performed without the use of Federal funds have been performed in substantial compliance with the eligibility requirements contained in § 455.41(c);

(n) The procedures for determining that technical assistance programs performed without the use of Federal funds have been performed in compliance with the requirements of § 455.42, for the purposes of satisfying the eligibility requirements contained in § 455.51(a)(3);

(o) The procedures for State management, monitoring and evaluation of technical assistance programs and energy conservation measures receiving financial assistance under this part;

(p) A description of the State's program for establishing and insuring compliance with qualifications for technical assistance analysts. Such policies shall require that technical assistance analysts have experience in energy conservation and—

(1) Be a registered professional engineer licensed under the regulatory authority of the State;

(2) Be an architect-engineer team, the principal members of which are licensed under the regulatory authority of the State; or

(3) Be otherwise qualified in accordance with such criteria as the State may prescribe in its State Plan to insure that individuals conducting technical assistance programs possess the appropriate training and experience in building energy systems. Such policies shall also require that technical assistance analysts be free from financial interests which may conflict with the proper performance of their duties;

(q) A statement setting forth—

(1) An estimate of energy savings which may result from the modification of maintenance and operating procedures and installation of energy conservation measures;

(2) A recommendation as to the types of energy conservation measures considered appropriate within the State; and

(3) An estimate of the costs of carrying out technical assistance and energy conservation measures programs; and

(r) For purposes of the technical assistance program, § 455.42, a statement setting forth uniform conversion factors to be used in the technical assistance analysis for conversion of fuels to Btu equivalents.

§ 455.91 Submission and approval of State plans.

(a) Proposed State Plans or amendments necessitated by a change in regulations shall be submitted to the Secretary within 90 days of the effective date of this subpart or any amended regulations. The Secretary, upon request and for good cause shown, may grant an extension of time.

(b) The Secretary shall, within 60 days of receipt of a proposed State Plan, review each plan and, if it is found to conform to the requirements of this part, approve the State Plan. If the Secretary does not disapprove a State Plan within the 60-day period, the Secretary will be deemed to have approved the State Plan.

(c) If the Secretary determines that a proposed State Plan fails to comply with the requirements of this part the Secretary shall return the plan to the State with a statement setting forth the reasons for disapproval.

(d) The Secretary shall review each amendment submitted by the State and, if it is found to conform to the requirements of this part, approve the amendment. If the Secretary determines that a proposed State Plan amendment fails to comply with the requirements of this part, the Secretary shall return the amendment to the State with a statement setting forth the reasons for disapproval. With the consent of the Secretary, the State may submit a new or amended plan at any time.

§ 455.92 State plans developed by the Secretary.

(a) If a State Plan has not been approved by February 7, 1981, or within 90 days after completion of the preliminary energy audits, whichever is later, the Secretary may develop and implement a State Plan on behalf of the schools and hospitals in the State.

(b) Subsequent to the development of a State Plan by the Secretary, the State may submit its own State Plan and the Secretary shall approve or disapprove such plan within 60 days after receipt by the Secretary. If the proposed plan meets the requirements of this part, and is not inconsistent with any plan developed and implemented by the Secretary, the Secretary shall approve the State Plan which shall automatically replace the plan developed by the Secretary.

Subpart I —Allocation of Appropriations Among the States

§ 455.100 Allocation of funds.

(a) The Secretary will allocate available funds among the States for the purpose of awarding grants to schools, hospitals, units of local government, and public care institutions and coordinating agencies to implement technical assistance and energy conservation measures grant programs in accordance with this part.

(b) The Secretary shall notify each Governor of the total amount allocated for grants within the State for any grant program cycle—

(1) For schools and hospitals, the allocation amount shall be for technical assistance programs, together with any limitation placed on technical assistance, and energy conservation measures; and

(2) For units of local government and public care institutions, the allocation amount shall be solely for technical assistance programs.

(c) The Secretary shall notify each Governor of the period for which funds allocated for a grant program cycle will be made available for grants within the State.

(d) Each State shall make available up to 10 percent of its allocation for schools and hospitals in each grant program cycle to provide financial assistance, not to exceed a 90 percent Federal share, for technical assistance programs and energy conservation measures for schools and hospitals determined to be in a class of severe hardship. Such determinations shall be made in accordance with § 455.71(c).

§ 455.101 Allocation formulas.

(a) Financial assistance for conducting technical assistance programs for units of local government and public care institutions shall be allocated among the States by multiplying the sum available by the allocation factor set forth in paragraph (c) of this section.

(b) Financial assistance for conducting technical assistance programs and acquiring and installing energy conservation measures including renewable resource measures, shall be allocated among the States by multiplying the sum available by the allocation factor set forth in paragraph (c) of this section.

(c) The allocation factor (K) shall be determined by the formula—

$$K = \frac{0.07}{N} + 0.1\,\frac{(Sfc)}{(Nfc)} + 0.83\,\frac{(SP)(SC)}{(NPC)}$$

where, as determined by DOE—

(1) Sfc is the projected average retail cost per million Btu's of energy consumed within the region in which the State is located, as contained in current regional energy cost projections obtained from the Energy Information Administration.

(2) Nfc is the summation of the Sfc numerators for all States;

(3) N is the total number of eligible States.

(4) SP is the population of the State, as contained in the most recent Bureau of the Census, Department of Commerce, Official Census documents;

(5) SC is the sum of the State's heating and cooling degree days, as contained in the National Oceanic and Atmospheric Administration's most recent editions of "State, Regional and National Monthly and Seasonal Heating Degree Days, Weighted by Population;" and "State, Regional and National Monthly and Seasonal Cooling Degree Days, Weighted by Population;" and

(6) NPC is the summation of the (SP)(SC) numerators for all States.

(d) Except for the District of Columbia, Puerto Rico, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, and the Virgin Islands, no allocation available to any State may be less than 0.5 percent of all amounts allocated in any grant program cycle. No State will be allocated more than 10 percent of the funds allocated in any grant program cycle.

§ 455.102 Reallocation of funds.

(a) If a State Plan has not been approved and implemented by a State by the close of the period for which allocated funds are available as set forth in the notice issued by the Secretary pursuant to § 455.100(c), funds allocated to that State for technical assistance and energy conservation measures will be reallocated among all States for the next grant program cycle, if available.

(b) If a State Plan has not been approved by February 7, 1981, or within 90 days after completion of the preliminary energy audits, whichever is later, the Secretary may develop and implement a State Plan on behalf of the schools and hospitals within the State. If the Secretary does not develop a State Plan for a State, the funds reserved for that grant program cycle for schools and hospitals in that State will be reallocated for the next grant program cycle among all States for schools and hospitals.

(c) The Secretary shall reallocate the funds which remain unobligated by DOE at the end of any grant program cycle among all States in the next grant program cycle.

[FR Doc. 85–10070 Filed 4–29–85; 8:45 am]

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APPENDIX F

Energy Audit Workbook

ENERGY AUDIT
WORKBOOK

FOR

THE MONTANA INSTITUTIONAL BUILDINGS GRANTS PROGRAM (IBGP)

REVISED MAY 1983

DEPT. OF NATURAL RESOURCES AND CONSERVATION (DNRC)
ENERGY DIVISION
CONSERVATION AND RENEWABLE ENERGY BUREAU
32 SOUTH EWING
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1. Building Energy Consumption Inventory . . . . 3 ☐

Complete the Building Energy Consumption survey. This will give you a basic run-down of what type of energy systems exist in the building, how much fuel is used, what kinds of fuel are used, and what the building's potential is for solar or other renewable energy resource systems. Instructions are included in this step.

2. Energy Savings Recommendations 13

Option A - Complete the Achieved Energy Savings Computation (instructions are included in this step) if an energy conservation program already is in effect for the building being audited. Buildings which can show a 20 percent savings of energy in accordance with this step must list all O&Ms and Retrofits undertaken to accomplish these savings. (You can use the Energy Audit Checklist as a guide.) Then, skip Step 2 - Option B, and go on to Step 3. If a 20 percent savings cannot be shown, you must complete Step 2 - Option B, the Energy Audit Checklist. 13 ☐

Option B - Complete the Energy Audit Checklist. The 63 items listed in the checklist cover common energy consumption inefficiencies found in eight basic energy systems: Administrative (the operation and use of the building by people), Lighting, Building Envelope, Ventilation, Heating, Cooling, Water Heating and Special. The letters used in the checklist numbering system indicate which of the eight systems each item is in (A-1, V-3, S-4, etc). Corresponding calculations follow some of the checklist items. These calculations should be completed if the respective O&M is recommended. 15 ☐

3. Summary Tables for Potential Energy Savings. . . . . . 61 ☐

Using results from calculations in Part 2, Option B complete the summary and calculate annual savings.

4. Evaluation Potential for Energy Conservation Measures 63 ☐

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Page   Check if Completed

5. Evaluation of Potential for Solar and Renewable Resource Measures . . . . 65 ☐

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PREFACE

Energy conservation and energy management may seem like dull subjects that are not worth spending your time on, but skillful energy management can mean big savings in energy use and big dollar savings to your institution. Everyone benefits from energy conservation: the national interest benefits when energy resources are not wasted; the institution benefits by not paying for energy it really doesn't need; and the public benefits when unnecessary costs are not added to the tax rolls.

Substantial savings can be realized by implementing low cost or no cost operational and maintenance (O&M) changes. By instituting O&M's one building in Montana has reduced its energy consumption by 28.4 percent!

Institutions must implement an ongoing program to reduce energy consumption. Such a program should also make the people who use the building aware of the impact their actions contribute toward conservation. The first step in an energy management program is to gather baseline data. In the Institutional Buildings Grants Program this is accomplished by completing the Energy Audit Workbook.

An administrator or maintenance manager can conserve a substantial quantity of energy by maintaining the building at its optimum designed conditions. This is energy saved and dollars saved, since little or no capital investment is required.

To conduct a continuing energy conservation/maintenance program a checklist of items to be done on a regular basis should be set down and followed faithfully. Part II of the workbook is in the form of a checklist that will aid in identifying operational and maintenance changes that will result in energy conservation.

INTRODUCTION

While all administrators and maintenance managers of institutions wish to do their part by conserving energy, they often overlook the positive impact that energy conservation can have on their operating budgets. In a typical institution, it is possible to save as much as 20 percent of utility costs (30 percent for schools and hospitals) through common sense actions without any appreciable capital expenditures.

The Energy Audit Workbook has been designed for use by certified energy auditors in auditing eligible buildings under the Montana Institutional Buildings Grants Program. It is a non-technical guide to identifying and correcting energy consumption inefficiencies in building systems. Auditors who use this workbook under the grants program are required to have been trained in its use by the Montana DNRC Energy Division. One workbook should be used for each building audited under the program. As the Energy Auditor, you do not have to be an engineer to identify those areas where energy and real dollar savings can be realized. Just keep in mind that, up until 1975 or 1976, energy conservation was not a major factor in the design of facilities. LOOK FOR THE OBVIOUS--and that is the purpose of this workbook: finding savings through an energy audit.

The first obvious thing to look at is the lighting. Are the hallways, classrooms, lobbies, kitchens, cafeterias, mechanical rooms, and nonessential areas overlighted? Common sense will tell you which areas are, and good guesswork can enable you to reduce the number of lamps in the excessively bright areas. Since fluorescent lamps use much less energy than incandescent lamps, it is feasible to replace incandescent lamps with fluorescent fixtures, where possible. If a mechanical room has only incandescent lamps, good economic sense tells you not to replace the lamps if the room is used only one or two hours a week. Just make sure that the lamps are turned off when the room is not occupied. For that matter, turning off lights when not needed is an obvious goal.

This is just one of the areas that offers energy savings. The purpose of the workbook is to bring "the obvious" to your attention. This can be readily accomplished by you through filling out the form and following the examples given in the workbook. You will be surprised at how many items you will find that offer savings.

The Energy Audit Workbook has been prepared by the Montana DNRC, Energy Division, for use in the Montana Institutional Buildings Grants Program, authorized by the National Energy Act of 1978. The workbook is based on a publication entitled: "Making Sense of Your Energy Dollar," prepared for the U.S. Department of Energy.

The Montana Institutional Buildings Grants Program is managed by the Montana DNRC Energy Division. The program is funded, in part, by the U.S. Department of Energy. Matching funds are provided by the State of Montana and eligible institutions. While recommendations contained in this workbook have been reviewed for technical accuracy, the Montana DNRC Energy Division and the U.S. Department of Energy are not liable if potential cost savings identified as a result of using this workbook are not actually achieved. None of the above agencies endorses or recommends the use of any specific brand of equipment which may be represented in this workbook.

PART I: BUILDING ENERGY CONSUMPTION INVENTORY

SECTION 1: BUILDING IDENTIFICATION

DATE ____________________

1. What is the correct name of the building? ____________________
2. What is the name of the institution? ____________________
3. What is the street address, city, zip? ____________________
4. Who is the project person? ____________________
   Phone: ____________________
5. Who is the legal owner of the building? ____________________
   Mailing address, city, zip code: ____________________
6. What type of building is it?
   (a) ☐ School Facility
   (b) ☐ Hospital Facility
   (c) ☐ Building owned and primarily occupied by a Unit of Local Government
   (d) ☐ Building owned and primarily occupied by a Public Care Institution
7. Which ownership category describes building owner?
   (a) ☐ Public
   (b) ☐ Private Nonprofit
   (c) ☐ Indian Tribe
8. What is the building function?

   School
   (a) ☐ Elementary
   (b) ☐ Secondary
   (c) ☐ College or Univ.
   (d) ☐ Vocational
   (e) ☐ Adm. Building
   (f) ☐ Other (specify)
   ____

   Hospital
   (g) ☐ General
   (h) ☐ Tuberculosis
   (i) ☐ Other (specify)
   ____

   Local Government
   (j) ☐ Office
   (k) ☐ Storage
   (l) ☐ Service
   (m) ☐ Library
   (n) ☐ Police Station
   (o) ☐ Fire Station
   (p) ☐ Other (specify)
   ____

   Public Care
   (q) ☐ Nursing Home
   (r) ☐ Long-term Care-Other than Nursing Home
   (s) ☐ Rehabilitation Facility
   (t) ☐ Public Health Center
   (u) ☐ Residential Child Care
   (v) ☐ Other (specify) ____________________
9. How many stories in the building? ____________________
10. When was the last major addition? ____________________
11. When was the building first put in service? ____________

12. Which describes the building location?

(a) ☐ Urban
(b) ☐ Sub-urban
(c) ☐ Rural

13. What functional use changes are planned within the next 15 years?

(a) ☐ None
(b) ☐ Demolition
(c) ☐ Rehabilitation
(d) ☐ Conversion (specify) ____________________
(e) ☐ Other (specify) ____________________

14. What is the building condition?

(a) ☐ Excellent
(b) ☐ Good
(c) ☐ Fair
(d) ☐ Poor

Provide a brief explanation: ____________________

____

15. What is the building's gross square footage (GSF) calculated from the outside building dimension? (a) ____________________

What is the heated square footage? (b) ____________________

What is the cooled square footage? (c) ____________________

16. What is the total glass square footage? ____________________

	North	South	East	West	Total
Single Pane	________	________	________	________	________
Double Pane	________	________	________	________	________

17. What is the exterior wall square footage? (a) ____________ What is the south wall square footage? (b) ____________ What is the U Value of the walls? (c) ____________ (See page 59) (d) Describe the structural makeup of the exterior walls: ____________ (e) Describe the structural makeup of the interior walls: ____________ (f) Describe the structural makeup of the foundation: ____________

18. What is the area of the roof? (a) ____________ What is the U value of the roof? (b) ____________ (See page 61) (c) Describe the structural makeup of the roof: ____________ (d) List any roof top structures (example: Chimneys, etc.): ____________ (e) Describe the structural makeup of the ceiling: ____________ (f) Describe the structural makeup of the floors: ____________.

19. What is the average occupancy? ____________________.

20. Annual Operating Hours - Table 1

Daily hours of operation	x	Days per week	=	Total hours per week

Weekly Non-Or Limited-Use Periods

Jan-Mar	+	April-June	+	Jul-Sept	+	Oct-Dec	=	Total

Annual Operating Hours

Total hours per week	x	(52 minus non-use weeks)	=	Annual operating hours

SECTION 3: ENERGY CONSERVATION PRACTICES

21. In order to fulfill the Energy Audit Agreement, energy consumption data for the first year following the audit will be reported to the IBGP Energy Division.

Has a person been designated to monitor and evaluate energy use in the building? Circle: yes or no
If yes, enter name, position and phone number where monitor can be reached:____

____

If no, or this person will not provide follow-up information, give name, position and phone number of person who will provide follow-up data:____

____

22. What activities have been undertaken to conserve energy in the building?

(a) ☐ No activities

(b) ☐ A partial energy audit to indicate areas of potential savings was completed by a non-engineer.

(c) ☐ An energy audit was completed but did not comply with IBGP regulations.

(d) ☐ Detailed studies have been completed by engineers and/or architects indicating energy conservation opportunities in the building.

(e) ☐ Detailed studies have been completed by engineers and/or architects indicating energy conservation opportunities in the building including feasibility of renewable resources.

23. Does this institution plan to apply for federally funded Technical Assistance? __________
Or for Energy Conservation Measures funds?__________

24. What major conservation measures have been implemented in the building?

Measure	Cost	Annual Energy Savings
(example: insulated roof-June,80	$24,000	$4,500)

SECTION 4: ENERGY CONSUMPTION DATA

25. Is this building part of a complex, a group of buildings that have one common energy meter or a central power plant? ☐ yes ☐ no

If yes, what is the square footage of the complex ________________
How many buildings are in the complex? __________

Table 2 Provide energy consumption data for the previous calendar year. Attach copies of the utility bills. For the individual building or for the complex. Check one: ☐ individual building ☐ complex

19 __	Electricity		Natural Gas		Fuel Oil		Other ________	
	KWH	Cost	Therms or CCF	Cost	Gallons	Cost	Units	Cost
Jan								
Feb								
Mar								
Apr								
May								
June								
July								
Aug								
Sep								
Oct								
Nov								
Dec								
Total								

Table 3 Individual Building: Using a utilization factor of 1 (100%) use Table 2 data to complete this section. Complex: Use Table 2 data and utilization factors that reflect the percentage consumption of this building. Utilization factors must be calculated taking into consideration the building square footage and energy system characteristics.

Fuel Type	Building Utilization		Annual Consumption (from above table)		Conversion Factor		Annual BTU	Annual Cost
Electricity		x	KWH	x	3,413	=	$\times 10^6$	$
Natural Gas		x	therms	x	100,000	=	$\times 10^6$	$
		x	CCF	x	103,000	=	$\times 10^6$	$
Fuel Oil#2		x	gal	x	138,690	=	$\times 10^6$	$
Fuel Oil#6		x	gal	x	149,690	=	$\times 10^6$	$
Coal		x	ton	x	24,500,000	=	$\times 10^6$	$
LPG(Propane)		x	gal	x	95,475	=	$\times 10^6$	$
Purchased Steam		x	lbs	x	1,390	=	$\times 10^6$	$
Other		x		x		=	$\times 10^6$	$
					Total		$\times 10^6$	$

BTU per GSF (divide Total BTU by GSF, See #15, Page 4)	Cost per GSF (divide Total Cost by GSF, See #15, Page 4)

SECTION 5: SYSTEMS INVENTORY (CHECK AS MANY AS APPLICABLE)

26. Primary Heating Systems

(a) ☐ Hot water/steam supplied from central plant
(b) ☐ Steam boiler
(c) ☐ Hot water boiler
(d) ☐ Radiant (baseboard)
(e) ☐ Heat pump
(f) ☐ Forced air
(g) ☐ Solar
(h) ☐ Other (specify)

27. Heating Fuels

(a) ☐ Electricity
(b) ☐ Natural gas
(c) ☐ Fuel Oil #2
(d) ☐ Fuel Oil #6
(e) ☐ Coal
(f) ☐ LPG (propane)
(g) ☐ Other (specify)

28. Heating System Location

(a) ☐ Outside building
(b) ☐ Within building on ground floor
(c) ☐ Within building in basement
(d) ☐ On roof
(e) ☐ Other (specify)

If located in building or on roof specify type of system:

(a) ☐ Centrally located
(b) ☐ Multiple units
(c) ☐ Central & multiple units

29. Cooling System

(a) ☐ Chilled water supplied from central plant
(b) ☐ Chilled water-centrifugal
(c) ☐ Chilled water-absorption
(d) ☐ Refrigeration-electric compressor-water cooled
(e) ☐ Refrigeration—electric compressor-air cooled
(f) ☐ Refrigeration-steam turbine compressor
(g) ☐ Evaporative cooling unit
(h) ☐ Other (specify)

30. Cooling Fuels

(a) ☐ Electricity
(b) ☐ Natural gas
(c) ☐ Fuel Oil #2
(d) ☐ Fuel Oil #6
(e) ☐ Coal
(f) ☐ LPG Propane
(g) ☐ Solar
(h) ☐ Other (specify)

31. Terminal System

(a) ☐ Unitary

(b) ☐ Perimeter - hot water

(c) ☐ Perimeter - heated air

(d) ☐ Variable air volume

(e) ☐ Dual duct

(f) ☐ Terminal reheat

(g) ☐ Heat pump

(h) ☐ Other (specify) ______________________

32. Total horsepower of all air moving devices:

(a) Exhaust Fans ____________ HP

(b) All HVAC, HV, AC and Ventilating Units _________HP

(c) Total: ___________ HP (a + b)

33. If the primary heating system #26 is forced air, and/or if the terminal system #31 is other than perimeter radiation, then the total supply of CFM of the HV and/or AC system is ____________CFM.

34. The minimum percent of outside air brought into the building through the HV and/or AC system is _____________.

SECTION 6: SPECIAL SYSTEMS

35. Domestic Water Heating (If electric water heater go to page 9 #36)

(a) What type of fuel heats the building water? _____________

(b) Where is the water heating system located?_______________

(c) Is there a food service facility in the building?____________

(d) Are there laundry facilities in the building?____________

(e) General Water Use

The following consumption figures estimate general water use for:

Office Building or school without food service	1 gallon/person/day
Dormitory	13 gallon/person/day

Consumption figures for the following include food service prepared on site. If you use these figures do not do calculation (f).

Hospital or Nursing Home	18 gallon/person/day
Elementary School	1 gallon/person/day
Junior/Senior High School	2 gallon/person/day

__________ x __________ x __________ = ______________________ gal/yr
(occupants) (gal) (day/yr bldg is operated)

If food service is a consideration, unless otherwise indicated above also do calculation (f).

If laundry is a consideration also do calculation (g).

(f) Food Service Water Use

_______________ x 2.4 x _______________ = __________________gal/yr
(meals/day) (days/yr food service in operation)

(g) Laundry Water Use

3 x ____________ x 1.2 x ____________ x ________________ = ____________
(washer cap.) (loads/day) (days/yr laundry fac. operated) gal/yr

(h) Total gal/yr = ______________ + ______________ + ______________
(gal/yr from (e)) (gal/yr from (f)) (gal/yr from(g))

= ________________
Total gal/yr

(i) Total gal/yr_____ x 8.3 x (__________ °F - __________ °F) = ______________
(hot H_2O temp) (cold H_2O temp) Total Annual BTU

36. Minor Systems and Special Equipment

(Please indicate which of the following groups of equipment are contained in building.)

(a) ☐ Food Service Equipment
(b) ☐ Laundry Equipment
(c) ☐ Electric Hot Water
(d) ☐ Elevators
(e) ☐ Office Machines
(f) ☐ Diagnostic/Treatment Equipment
(g) ☐ Sterilization Service
(h) ☐ Home Ec/Shop Equipment
(i) ☐ Computer
(j) ☐ Other (include vending machine, refrigerated water fountain, television, kiln, etc.)

Table 4 List specific equipment in the following table. Calculate annual KWH or annual BTU per each item. Total KWH and BTUs separately. Totals should not overstate energy use for special equipment, they should be much less than total annual energy consumption for building.

Description	Number of Units	x	Name Plate Info KW /BTU	x	Hours/Day Operated	x	Days/Year Operated	=	Total Annual KWH	BTU
		x		x		x		=		
		x		x		x		=		
		x		x		x		=		
		x		x		x		=		
Total from additional attached pages if necessary								=		
TOTAL ENERGY USE SPECIAL SYSTEMS								=		

SECTION 7: ELECTRICAL CONSUMPTION SUMMARY

37. What kind of lighting is used in building? ____________________.

38. Interior Lighting - complete the following table using all rooms of building. Add another page if necessary.

a) Table 5

Type of Room	Number of Rooms		Number of Fixtures		Watts/ Fixture		Total Watts/ Room Type
		X		X		=	
		X		X		=	
		X		X		=	
		X		X		=	
		X		X		=	
		X		X		=	
					Total Watts	=	

b) ____________ ÷ ____________ = ____________

Total Watts ÷ Sq. Ft. of Building (page 4 #15) = Watts/Sq. Ft.

c) Table 5a

Type of Room	Total Watts/ Room Type (see Table 5)		Utilization Factor		Adjusted Watts
		X		=	
		X		=	
		X		=	
		X		=	
		X		=	
		X		=	
		Total Adjusted Watts		=	÷ 1000 =

Total K W Utilized

d) ____________ X ____________ = ____________

Total KW Utilized X Annual Operating Hours (#20, page 5) = Annual KWH Interior Lighting

39. Exterior Lighting

a) Total KW ________ X annual hours ____________ (Estimated Use) = ____________ (Annual KWH, Exterior Lighting)

40. HVAC Consumption - calculate energy consumption of fans, pumps, compressors, etc., as follows:

a) Total KWH from Table 2, page 6 ________ x Building Utilization Factor from Table 3, page 6 ________ = ____________ (Total Annual KWH)

b) Total lighting KWH ____________ (38d + 39a) + special systems KWH ____________ (#36, page 9, Table 4) = ____________ (Total KWH Non-HVAC)

(c) Annual KWH total ______________ (#40a) - KWH Non-HVAC ______________ (#40b)

= ______________ Annual KWH HVAC

41. Electrical Consumption Summary

Table 6

	Annual KWH	÷	Total Annual KWH (#40a)	x 100	=	Percentage Use
(a) Lighting (page 10: 38d & 39a)		÷		x 100	=	
(b) Special Systems (page 9: 36, Tab.4)		÷		x 100	=	
(c) HVAC (page 11: 40c)		÷		x 100	=	
				TOTAL		100%

SECTION 8: NON-ELECTRICAL CONSUMPTION SUMMARY

42. Baseload BTUs, non-electrical, non-heating energy consumed, for example, water heating and non-electrical appliances.

Calculate Baseload as follows:

Option 1 - use the BTU consumption for summer months if building is in operation with average occupancy, and is not cooled by non-electrical AC.

(a) (June BTUs ________ + July BTUs ________ + August BTUs ________) x 4

= ______________ Baseload

Option 2 - for buildings not operated with average occupancy during summer months.

(b) Water heating BTUs ________ (35i, page 9) + special system BTUs ________ (page 9, Table 4) = ________ Baseload

43. Non-electrical HVAC Consumption

Annual non-electrical BTUs __________ (page 6, Table 3) - baseload __________ (42a or 42b)

= ______________ Annual Heating BTU

Table 7

	÷	Total Non-Electric BTU (Table 3, Page 6)	x 100	Percentage Use
Total Baseload	÷		x 100	
Total Heating	÷		x 100	
			TOTAL	100%

SECTION 9: PERCENTAGE CALCULATIONS OF USE AND POTENTIAL SAVINGS

Table 8 Total Energy Consumption

System	Annual KWH	Consumption		Annual BTUs
Lighting	(from 38d + 39a, page 10)	x 3,413	=	
Special System(s)	(from Table 4, page 9)	x 3,413	=	
HVAC Electrical	(from 40c, page 11)	x 3,413	=	
Baseload	(see #43, page 11)			
Heating	(see #43, page 11)			
		TOTAL BTU	=	

Total from Table 3 (page 6)______ - Total from Table 8 ______________ = 0

This calculation is a check to make sure all BTU are accounted for, if not, recheck your figures.

Table 9 Percentage of Total Energy Consumption

System	Annual BTU (Table 8)		Total BTU (Table 8)			
Lighting		÷		x 100	=	%
Special System(s)		÷		x 100	=	%
HVAC Electrical		÷		x 100	=	%
Baseload		÷		x 100	=	%
Heating		÷		x 100	=	%
						100%

Table 10 Total Realizable Savings

System	Annual BTU (Table 8)	x	Possible Savings	=	Ultimate BTU Savings Realizable
Lighting		x	20%	=	
Special System		x	5%	=	
HVAC Electrical		x	5%	=	
Baseload		x	10%	=	
Heating		x	30%	=	
	Total BTU Savings Realizable			=	

Total BTU Savings Realizable ÷ Total BTU (Table 8) x 100 = ________ % Savings.

PART II: ENERGY SAVINGS RECOMMENDATIONS

OPTION A: Achieved energy Savings Computation. Demonstrating that appropriate energy conservation operation and maintenance procedures already have been implemented in the building, resulting in energy savings of 20 percent or more based on annual energy consumption records. This savings can be determined by filling out the Achieved Energy Savings Computation in this workbook. If 20 percent savings cannot be demonstrated go to Option B of this part.

OPTION B: If appropriate energy conservation operations and maintenance procedures have not been implemented or if a 20 percent savings cannot be demonstrated, go to Option B, Page 15.

OPTION A

This option should be completed for buildings which already have been scrutinized for energy conservation opportunities, and which can demonstrate significant energy savings resulting from such an energy conservation program. If the building has not yet undergone such scrutiny, go on to Part II, Option B and complete that section instead.

Also, if this option is completed, but 20 percent or greater energy savings cannot be shown, or if such savings can be demonstrated only for ineligible comparison years, go on to Part II, Option B and complete it.

Computation of Energy Savings

The percentage of energy savings resulting from an energy conservation program in which appropriate operation and maintenance procedures or retrofit steps have been implemented in the building must be calculated as follows:

A. Energy Use - Before Program

Calculate the total number of BTUs consumed in the building during the annual period from January through December prior to the completion of an energy conservation program. Use energy conversion factors specified in Part I, the Building Energy Consumption Inventory (Table 3, page 6). Record this total consumption figure in the blank below.

Time period January ______________ through December __________

Energy Use--Before: ____________________________________ BTUs

B. Energy Use--After Program

Calculate the total number of BTUs consumed in the building during an annual period from January through December after completion of an energy conservation program. Use energy conversion factors specified in Part I, the Building Energy Consumption Inventory. Record this total consumption figure in the blank below (Table 3, page 6).

Time period January ______________ through December ____________

Energy Use--After: ____ BTUs

C. Energy Savings

Calculate energy savings resulting from that energy conservation program by subtracting Energy Use--After from Energy Use--Before and record the figure in the blank below.

Energy Savings: ______________________ BTUs

D. Energy Savings Percentage

Calculate energy savings percentage as follows:

____________ ÷ ______________ x 100 = ________%
Energy Savings   Energy Use--Before

Energy Conservation Operation and Maintenance Procedures, and Retrofits

List all operation and maintenance procedures, plus any other energy conservation retrofit measures, that have been implemented in the building as a part of the energy conservation program.

____

____

____

____

____

____

____

____

____

____

____

Heating Degree Day Variance Calculation

Federal rules specify that the demonstration of energy savings of 20 percent or greater is valid only when the yearly periods being compared have a heating degree day (DD) variance of less than 10 percent. If the comparison period after the energy conservation program is more than 10 percent warmer than the comparison period before the energy conservation program, the demonstration of energy savings percentage is not valid. In such a situation, a different comparison period should be used, if this is possible.

Montana heating degree-day readings are obtained from stations located near most municipalities throughout the state. Readings are totaled for annual heating degree-day values.

If the degree day information for the location of the building being audited is not available, use the values for the municipality closest to the building.

A. HEATING DEGREE-DAY VALUES

Enter the heating degree-day values for the two annual periods compared in the previous section.

DD Before Program____________

DD After Program_____________

B. DEGREE DAY VARIANCE DETERMINATION

If degree-days AFTER are greater than degree-days BEFORE, no calculation is required because the comparison periods are valid automatically. If degree-days AFTER are less than degree-days BEFORE, calculate the degree-days variance as follows:

_________________ - ______________ = ___________________
Degree-Days Before   Degree-Days After   Degree-Day Variance

_________________ ÷ ________________ x 100 = ______________%
Degree-Day Variance   Degree-Days Before

OPTION B: ENERGY AUDIT CHECKLIST

INSTRUCTIONS FOR POTENTIAL ENERGY SAVINGS CALCULATIONS

Calculations are provided for most of the recommended O&M's to give an estimate of potential savings. For some O&M's no calculations are provided because no O&M is practical or possible for the stated condition, or calculation may be difficult to make due to its nature. For those conditions no energy savings estimate is required and you should leave those slots open on the summary sheet. However, the O&M and retrofit measure box for conditions that exist should be marked, whether or not energy savings calculation procedures apply. Without doing a detailed engineering analysis of all building energy using systems and their interactions, more precise results cannot be achieved.

Most data required for the estimated savings calculations will be collected in the energy audit. Climatic data can be acquired from the closest federal weather station.

Required Data for O&M Calculations

Required Data Heating

1h. Heating load (Table 8, page 12)______________BTU/yr.
If building is air conditioned other than by electric: BTU/yr _____x .75 = ______________ heating BTU/yr.

Or if all electric building (Table 8, page 12) ____________KWH/yr.
If building is air conditioned KWH/yr _____ x .75 =________Heating KWH/yr.

2h. Number of weeks in heating season ___________ wks/yr.

3h. Recommended thermostat setting __________°F.

4h. Average outside temperature during heating season ________°F.

5h. Gross area heating #15b, page 4 ____________ sq.ft.

6h. Glass area total #16, page 4 ___________sq.ft.

7h. Weekly operating hours heating system 168 hrs/wk.

8h. Percentage of outside air introduced by ventilation system #34, page 8 __________%.

9h. Degree days during normal heating season ________HDD.

10h. HVAC systems air handling capacity #33, page 8 __________CFM.

Required Data Cooling

1c. Cooling load #41c, page 11____________KWH/yr.
If building is electric heat KWH/yr_______ x .25 = _______Cooling KWH/yr.

Or 42a, page 11 _________BTU/yr x .25 = ___________Cooling BTU/yr.

Note: Above loads must be adjusted to reflect cooling only (i.e., analyzed during cooling season only; from #42a, page 11, deduct non-cooling items, domestic water, heating, special systems, etc.)

2c. Number of weeks in cooling season _______wks/yr.

3c. Recommended thermostat setting _______°F.

4c. Average outside temperature during cooling season __________°F.

5c. Gross area cooled #15c, page 4 ___________ sq.ft.

6c. Glass area #16, page 4: South _________ sq.ft.
East _________ sq.ft.
West _________ sq.ft.

7c. Degree days during normal cooling season __________CDD.

8c. Weekly operating hours cooling system __________hrs/wk.

Required Data Lighting

1L. Annual operating hours #20, page 5 _____________hrs/yr.

2L. Annual total interior lighting load #38d,page 10 _________KWH/yr.

3L. Annual total exterior lighting load #39, page 10 _________KWH/yr.

4L. Annual operating hours exterior lighting #39, page 10_________hrs/yr.

ADMINISTRATIVE SYSTEM

A-1. Thermostats on heating/cooling units are vulnerable to occupant adjustment.

Condition Exists ☐
Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

1) Reset thermostats to correct setting. ☐
2) Install or replace locking screws to prevent tampering. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Install tamper-proof locking covers on thermostats. ☐
- Install pre-set solid state electric thermostats if existing are electric. ☐
- Relocate thermostats in return air ducts where they will be inaccessible to occupants. ☐

Potential Energy Savings Calculations for Recommended Operational and Maintenance Changes:

1. Heating

A. Unauthorized thermostat setting ______ °F.

B. Estimated hours per week #A exists ______ hrs/wk.

Heating Energy Savings: 1h x ((A-3h)÷(A -4h)) x (B÷168) = __________

______ x ((______-______)÷(______-______)) x (______÷168) = __________
BTU/yr (KWH/yr)

2. Cooling

A. Unauthorized thermostat setting ______ °F.

B. Estimated hours per week #A exists ______ hrs/wk.

Cooling Energy Savings: 1c x ((3c-A)÷ (2 (4c-3c))) x B ÷ 8c = __________

_____ x ((_____-_____) ÷(2 (_____-_____)))x (_____÷_____) = __________
BTU/yr (KWH/yr)

Total A-1 = ___________BTU/yr (KWH/yr)

A-2. Thermostat settings have not been adjusted for change in seasons.

Condition Exists ☐
Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

3) Adjust thermostat to 65°F in heating season and to 78° during cooling season, except for interior zones required to meet codes and for reheat systems. ☐

*4) Change the location of thermostats from areas subject to extreme temperature flucuations, such as next to windows or over heating or cooling units. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Replace existing thermostat with one that has a separate setting for cooling and a separate setting for heating, or use one thermostat to control heating and another thermostat to control cooling. ☐

Potential Energy Savings Calculations for Recommended Operational and Maintenance Changes: Do not do this calculation if you did calculation for A-1.

1. Heating

A. Thermostat setting before adjustment ______°F.

B. Estimated hours per week at #A ______hrs/wk.

Heating Energy Savings: 1h x ((A-3h) ÷ (A -4h)) x (B ÷168) = ____________

___ x ((_____-_____) ÷ (_____-_____)) x (_____ ÷168) = ______________ BTU/yr (KWH/yr)

2. Cooling

A. Thermostat setting before adjustment ______°F.

B. Estimated hours per week at #A _______ hrs/wk.

Cooling Energy Savings: 1c x ((3c-A) ÷ (2(4c-3c))) x (B ÷ 8c) = ____________

______ x ((_____-_____) ÷ (2(_____-_____))) x (_____ ÷ _____) = ____________ BTU/yr (KWH/yr)

Total A-2 = ____________ BTU/yr (KWH/yr)

A-3. Unoccupied or little used areas which are heated or cooled unnecessarily (or large spaces having low occupancy are maintained at comfort conditions).

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

5) Reduce winter thermostat setting to 55°F in unoccupied areas. ☐

6) Where possible, turn off heating systems if nothing in space can freeze. ☐

7) Turn off cooling system in unoccupied areas, if possible. ☐

8) Use spot heaters/coolers in large spaces with low occupancy. ☐

*9) Disconnect electrical devices, close drapes, and shut off air systems, if nothing in space can freeze. ☐

10) Consider regrouping activities into smaller areas which can be conditioned separately from remainder of building. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Install system controls to reduce heating/cooling of unoccupied spaces. ☐

Potential Energy Savings Calculations for Recommended Operational and Maintenance Changes:

1. Heating

A. Gross area unoccupied space ________sq. ft.

B. Existing space temperature ________°F.

C. New set-back temperature ______ °F.

D. Hours per week at set-back temperature ______ hrs/wk.

Heating Energy Savings: 1h x ((B-C) ÷ (B-4h)) x (D ÷ 168) x (A ÷ 5h) = ______
______ x ((______ - ______) ÷ (______ - ______)) x (______ ÷ 168) x (______ ÷ ______)
= ______
BTU/yr (KWH/yr)

2. Cooling

A. Gross area unoccupied space ______ sq. ft.

B. Existing space temperature ______ °F.

C. New set back temperature ______ °F.

D. Hours per week at set back temperature ______ hrs/wk.

Cooling Energy Savings: 1c x ((C-B) ÷ (2(4c-B))) x D ÷ 8c x (A ÷ 5c) = ______
______ x ((______ - ______) ÷ (2(______ - ______))) x ______ ÷ ______ x (______ ÷ ______)
= ______
BTU/yr (KWH/yr)

Total A-3 = ______
BTU/yr(KWH/yr)

A-4. Off-hour activities are scheduled.

Condition Exists ☐
Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

11) Reschedule off-hour activities to accommodate partial shutdown of building systems. ☐

12) Reschedule custodial and cleaning activities during working hours whenever possible. ☐

13) Re-examine original assumptions regarding occupancy patterns and building usage. Modify patterns for increased energy efficiency. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Install an automated energy management system that will control all spaces in accordance with usage. ☐

Potential Energy Savings Calculations for Recommended Operational and Maintenance Changes:

1. Energy savings for heating and cooling

A. Calculate as per A-3 above substituting applicable conditions.
______ BTU/yr (KWH/yr)

2. Power savings

A. Total horsepower of motors shut down ______ hp.

B. Total annual hours system shut down ______ hrs/yr.

Power Savings: A x B x .75 = ____________(KWH/yr)

Total (1)______________BTU/yr (KWH/yr)

(2)______________ KWH/yr

A-5. Building temperatures are not adjusted for unoccupied periods.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

14) Reduce thermostat settings by a minimum of 10°F at nights, for weekends and holidays during heating season. ☐

**15) Shut down all air conditioning units at night, on weekends and holidays. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Install automatic controls such as time clocks or automated management systems. ☐

Potential Energy Savings Calculations for Recommended Operational and Maintenance Changes:

1. Heating--Temperature set back to no higher than 55°F.

A. Calculate as per A-3 above substituting applicable conditions.

Heating Energy Savings: $1h \times ((B-C) \div (B-4h)) \times (D \div 168) \times .5 =$ ____________

_____ x ((_____-_____) ÷ (_____-_____)) x (_____ ÷168) x .5 = ______________ BTU/yr (KWH/yr)

2. Cooling System shut down

A. Calculate power savings per A-4(2).

Cooling Energy Savings: A x B x .75 = ____________

_______ x ______ x .75 = ____________ KWH/yr

Total A-5 = 1. ______________ BTU/yr (KWH/yr)

2. ______________ KWH/yr

A-6. Heating/cooling equipment is operating in lobbies, corridors, vestibules and/or other public areas.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

*16) Close supply ducts and radiators and/or lower heating set points in the above areas if there is no possibility of freeze-up. Disconnect electrical heating units (or switch off at breaker box). ☐

17) Close air conditioning supply ducts serving the above areas. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Properly adjust and balance air/water systems and controls. ☐

No calculation.

A-7. Heating/cooling equipment is started before occupants arrive and/or is operating during last hour of occupancy.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

**18) Experiment with start-up times and duration of operation to determine satisfactory comfort levels for occupants. Reduce or turn off heating and cooling during the last hour of occupancy, allowing the building to "coast." ☐

Suggested Retrofits: Indicate recommended retrofits:

- Install a time clock or an automated energy management system that will reduce heating and/or turn off air conditioner. ☐

Potential Energy Savings Calculations for Recommended Operational and Maintenance Changes:

1. Heating

A. Recommended night set back __________°

B. Reduction of operating hours possible ___________ hrs/wk

C. Present night temperature setting ______°

Heating Energy saving: lh x ((C-A)+(C-4h) x (B+ 168) = ___________

_________ X ((_____- _____) + (____ - ____)) X (____ + ____) = _________

2. Cooling System shut down

A. Calculate power savings per A-4(2)

Cooling Energy Savings: A x B x .75 = ________________

______ x ______ x .75 = ___________ KWH/yr

Total A-7 = 1. ___________ BTU/yr (KWH/yr)

2. ___________ KWH/yr

A-8. Use of equipment associated with laundry and custodial services coincides with heavy electrical demand periods.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

19) Require that major electrical equipment be used in accordance with guidelines that avoid peak electrical demand periods. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Install a demand control system to automatically monitor power demand and shut off assigned secondary loads to lower demand peaks to pre-established level. ☐

No calculation

A-9. Blinds and curtains are not used to help insulate the building.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

20) Instruct personnel to close interior shading devices to reduce night heat loss in winter and to reduce solar heat gain during the summer. ☐

21) Repair or replace damaged or missing shading devices. ☐

22) Place reminders where appropriate. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Add reflective or heat absorbing films to reduce solar heat gain in summer. (Caution: Natural lighting and solar heat gain in winter will be reduced. Also, unless protected by an additional layer of glass, these films are subject to damage.) ☐
- Install outdoor shading devices. ☐

Potential Energy Savings Calculations for Recommended Operational and Maintenance Changes:

1. Heating

A. U value of glass ___________.

Heating Energy Savings: 6h x A x (3h-4h) x 168 x 2h x .2 = __________

_____ x _____ x (_____-_____) x 168 x _____ x .2 = ____________________ BTU/yr

2. Cooling

Cooling Energy Savings: 6c x .75 x solar radiation x .3 x 2c x $\frac{7}{365}$ = __________

South = _____ x .75 x 458,600 x .3 x _____ x $\frac{7}{365}$ = ______________ BTU/yr

East = _____ x .75 x 297,000 x .3 x _____ x $\frac{7}{365}$ = ______________ BTU/yr

West = _____ x .75 x 297,000 x .3 x _____ x $\frac{7}{365}$ = ______________ BTU/yr

Cooling Total ______________ BTU/yr

Total A-9 = ______________ BTU/yr

A-10. No records of maintenance for motors and motor driven equipment are available.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

23) Using name plate data, prepare an up-to-date list of all motors and pumps used in the facility and list routine maintenance to be performed on each. Check regularly for: ☐

1. Correct motor voltage and amperage.
2. Loose connections and worn contacts.
3. Unbalanced voltages on 3-phase motors.
4. Improper grounding.
5. Packing wear.
6. Wear and binding on bearings and drive belts.
7. Proper sequencing of pumps and motors.

Suggested Retrofits: Indicate recommended retrofits:

- Replace worn equipment with more efficient units, if available. ☐

No calculation.

A-11. Control devices are not inspected on a regular basis.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

24) Routinely check all time clocks and other control equipment for proper operation; correct time and day; and proper programming of on-off set points. Protect from unauthorized adjustment. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Consider using an automated energy management system as an alternative. ☐

No calculation.

A-12. Conditioned air or heated water is discarded.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

25) None practical

Suggested Retrofits: Indicate recommended retrofits:

- It is important for a building owner to be aware of heat recovery measures. However, it is not wise to install such equipment without first analyzing the energy characteristics of the building, performance of the hardware, and how it fits into the overall energy plan. ☐

No calculation.

L-1. Incandescent lamps are used in offices, workrooms, hallways and gymnasiums.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

26) Where possible use a single incandescent lamp of higher wattage rather than two or more smaller lamps of combined higher wattage. ☐

27) Discontinue using extended service lamps except in special cases such as recessed directional lights where short lamp life is a problem. ☐

28) Discontinue using multi-level lamps. The efficiency of single wattage lamp is higher per watt than a multi-level lamp. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Replace non-decorative incandescent lamps with more energy conserving types such as fluorescents in general purpose areas ☐

Potential Energy Savings Calculations for recommended Operational and Maintenance Changes:

A. Total wattage of incandescent lamps that may be replaced with lower wattage lamps ________ watts

B. Total replacement lamp wattage ________ watts

C. Percent of hours lights are used ________, Table 5a, page 10

Lighting Energy Savings: (A - B)x (1L x C) ÷ 1,000 = ________

(_____ - _____)x (_____ x _____) ÷ 1,000 = ________ KWH/yr

Total L-1 = ________ KWH/yr

L-2. In fixtures where fluorescent lamps have been removed, the ballasts have not been disconnected.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

*29) Disconnect ballasts, which still use significant amounts of energy even though tubes have been removed. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Replace unnecessary tubes with "dummy" types which draw little current and yet provide uniform lighting effect. ☐

Potential Energy Savings Calculations for Recommended Operational and Maintenance Changes:

A. Total wattage of removed tubes ________ watts

B. Percent of hours lights are used ___________.

Lighting Energy Savings: A x .2 x (1L x B) ÷ 1,000 = ____________

_____ x .2 x (_____ x _____) ÷ 1,000 = ____________ KWH/yr

Total L-2 = ______________ KWH/yr

L-3. When burned out fluorescent lamps and/or ballasts have been replaced, more efficient lights have not been installed.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

*30) When relamping, replace fluorescent tubes with more efficient and lower wattage types such as 35-watt instead of 40-watt to achieve a reduction in electrical energy consumption. Wherever possible, replace burned out ballasts with more efficient lower wattage energy conserving ballasts. ☐

*31) Consider not replacing burned out bulbs or lamps, and disconnecting ballasts in areas where delamping is possible. For example, in four-lamp fixtures allow two lamps to remain, disconnecting appropriate ballasts. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Install more efficient fluorescent tubes and ballasts in all existing fixtures. (Verify that new lamps will work with existing ballasts.) ☐
- Lowering fixtures will increase illumination levels on the task area, and may permit a reduction in the number of fixtures or the wattage of lamps. ☐

Potential Energy Savings Calculations for Recommended Operational and Maintenance Changes:

A. Total wattage of 40 watt tubes ________ watts

B. Percent of hours lights are used ___________.

Lighting Energy Savings: A x .14 x (1L x B) ÷ 1,000 = ____________

______ x .14 x (_____ x _____) ÷ 1,000 = ____________ KWH/yr

Total L-3 = ______________ KWH/yr

L-4. Lamps and fixtures are not clean.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

32) Establish a regular inspection and cleaning schedule for lamps and luminaries (fixtures). Dust buildup reduces effectiveness. ☐

33) Replace lens shielding that has turned yellow or hazy with new acrylic lenses which do not discolor. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Replace outdated or damaged luminaries (fixtures) with modern types that are easy to clean. ☐

Potential Energy Savings Calculations for recommended operational and Maintenance Changes:

Lighting Energy Savings: 2L x .05 = __________

__________ x .05 = _______________ KWH/yr

Total L-4 = _______________ KWH/yr

L-5. Exterior lighting is used.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

*34) Replace exterior 150-watt flood lamps with 75-watt flood lamps to reduce consumption while maintaining adequate illumination. ☐

*35) Eliminate outdoor lighting where practical. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Install a control device (i.e., time clock, photocell) to automatically turn off lights when not needed. ☐
- Replace exterior incandescent lamps with more efficient types such as high pressure sodium, or metal halide. ☐

Potential Energy Savings Calculations for recommended operational and Maintenance Changes:

A. Total exterior replacement load ________KW

Lighting Energy Savings: 3L - (A x 4L) = _____________

_____ - (_______ x ______) = ____________ KWH/yr

Total L-5 = _______________ KWH/yr

L-6. Lights are on in unoccupied areas.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

36) Provide signs instructing occupants and janitorial staff to turn off lights when leaving room. ☐

37) Organize task areas to eliminate unnecessary illumination. ☐

38) Identify areas being controlled by gauged switches. ☐

39) Assure wall switch timers function properly. ☐

Suggested Retrofits: Indicate recommended Retrofits:

- Rewire switches so a single switch does not control all fixtures in multiple work spaces. ☐
- Provide timer switches in remote or seldom used areas where there will be brief occupancy periods. ☐

Potential Energy Savings Calculations for recommended Operational and Maintenance Changes:

A. Turn off lights in unoccupied areas.

Assume 5 percent savings x 2L = __________

.05 x __________ = __________ KWH/yr

B. Organize task lighting

Assume 3 percent savings x 2L = __________

.03 x __________ = __________ KWH/yr

Total L-6 = ____________ KWH/yr

L-7. Natural lighting is not optimized.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

40) Utilize natural lighting whenever possible. ☐

41) Clean walls or repaint with light relective non-glossy colors. ☐

42) Locate work stations requiring high illumination adjacent to windows. ☐

43) Switch off lights when daylight is sufficient. ☐

44) Clean windows and skylights. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Install light sensors and dimming equipment which automatically compensate for varying lighting conditions. ☐

Potential Energy Savings Calculations for recommended Operational and Maintenance Changes:

A. Lighting wattage in above space __________watts

B. Daily hours natural lighting available __________hrs/day

C. Days per year building in use __________

Lighting Energy Savings: (A x B x C) ÷ 1,000 = __________

(__________ x __________ x __________) ÷ 1,000 = __________ KWH/yr

Total L-7 = __________ KWH/yr

L-8. Two lamps have not been removed from four-lamp fixtures where possible.

Conditions Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

45) Remove two lamps and disconnect ballasts. ☐

Suggested Retrofits:

None practical.

Potential Energy Savings Calculations for recommended Operational and Maintenance Changes:

A. Number of fixtures from which (2) tubes and ballasts can be disconnected __________fixtures

B. Wattage of each tube __________watts

C. Percent of hours lights are used __________

Lighting Energy Savings: 2 x A x B x (1L x C) 1,000 = __________

2 x __________ x __________ x (________x________) 1,000 = __________ KWH/yr

Total L-8 = ____________
KWH/yr

L-9. Lamps are replaced individually as they burn out.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

46) Establish a group relamping schedule. Lamp manufacturers sales offices can provide a computerized relamping schedule at minimal or no cost. ☐

No calculations.

L-10. Ceilings and other room surfaces have reduced reflectivity due to dirt.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

47) Clean surfaces. ☐

48) When repainting or recovering, use coatings or coverings with good reflectance. ☐

No calculations.

L-11. Decorative lighting is excessive and/or not controlled optimally.

Condition Exists ☐

Condition doesn't Exist ☐

Seggested O&M's: Check O&M's that are recommended:

49) Replace burned out lamp with lower wattage almps. ☐

50) Establish schedule for manual contraol or control operation with existing photoelectric or time clock controls if practical. ☐

No calculations.

L-12. Security lighting is not automatically controlled and/or lighting levels are excessive.

Condition Exists ☐

Condition doesn't Exist ☐

Suggest O&M's: Check O&M's that are recommended:

51) Replace burned out lamps with lower wattage lamps. ☐

52) Establish manual operation schedule considering change in daylight with season. ☐

No calculations

L-13. Deep baffeled downlighting fixtures have conventional "R" reflector lamps installed.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

53) Replace burned out "R" lamps with elliptical reflector "ER" lamps which yield approximately the same average light level for half the energy cost. ☐

No calculations.

B-1. Improper alignment and operation of windows and doors which allow excessive infiltration.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

54) Realign or re-hang windows or doors that do not close properly. In extreme cases consider permanent sealing of windows. ☐

55) Make sure automatic door closing mechanisms work properly. Adjust for faster return. ☐

56) Replace or repair faulty gaskets in garage or on other overhead doors. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Consider resizing exterior doors (i.e., delivery doors), making them smaller to reduce excessive infiltration. ☐
- Add expandable separate enclosures, where practical. ☐
- Install self-closing doors on openings to unconditioned spaces. ☐
- Install a switch on overhead doors that prevents activation of heating/cooling units when door is open. ☐
- Install vestibule doors at major entrances. ☐

Potential Energy Savings Calculations for recommended Operational and Maintenance Changes:

A. If HVAC system is predominantly an air distribution system, use value Item 8h. If not an air distribution, use value of (0) zero.

Energy Savings: .15 x (1-A) x 1h = ________

.15 x (1 - ______) x ________ = ____________ BTU/yr (KWH/yr)

Total B-1 = ____________ BTU/yr (KWH/yr)

B-2. Ceiling/roof insulation is inadequate or has been water damaged.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

*57) Before replacing water damaged insulation, repair roof where required. ☐

58) Verify that vapor barrier faces the conditioned space and is intact. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Add new insulation to meet recommended standard. Check the cost effectiveness of this measure particularly if your facility is over three stories. ☐

Potential Energy Savings Calculations for recommended Operational and Maintenance Changes:

A. "U" value roof, #18, page 4, Energy Audit __________.

B. Area of water damaged roof area __________sq. ft.

Energy Savings Heating: .75 x A x B x 24 x 9h = __________

.75 x ______ x ______ x 24 x ______ = _______________ BTU/yr

Energy Savings Cooling: .75 x A x B x 24 x 7c = __________

.75 x ______ x ______ x 24 x ______ = _______________ BTU/yr

Total B-2 = ______________ BTU/yr

B-3. Weatherstripping and caulking around windows, doors, conduits, piping, exterior joints, or other areas of infiltration is worn, broken or missing.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

59) Use quality weatherstripping and caulking to insure that all areas of infiltration are sealed. ☐

60) Replace broken or cracked windows. (Air leakage is most evident when wind is blowing against the side of the building.) ☐

Suggested Retrofits: Indicate recommended retrofits:

- Where practical, cover all window and through-the-wall cooling units when not in use. Specially designed covers can be obtained at relatively low cost. ☐
- In areas with constant strong winds, consider installing wind screens to protect exterior doors from direct blast of prevailing winds. Screens can be opaque, constructed inexpensively from concrete block or can be transparent, constructed of metal framing with armored glass. Careful positioning is necessary for infiltration control. ☐

Potential Energy Savings Calculations for recommended Operational and Maintenance Changes:

Use same procedure as per B-1. If energy savings calculation performed for B-1, DO NOT duplicate for B-3.

Energy Savings = ____________ BTU/yr (KWH/yr)

Total B-3 = ______________ BTU/yr (KWH/yr)

B-4. Excessive expanses of glass exist on exterior walls.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

61) When replacing windows, replace with thermopanes, utilizing the same casings. ☐

62) Keep curtains and drapes closed in unoccupied spaces. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Totally or partially insulate windows. Consider replacing windows with insulated walls. ☐
- Install double pane windows ☐
- Consider adding reflective or heat absorbing film to minimize solar gain in summer and heat loss in winter. (Any window film reduces natural lighting and winter solar gain.) ☐
- For south facing exterior walls consider installing solar collecting devices. ☐

Potential Energy Savings Calculations for recommended Operational and Maintenance Changes:

Use same procedure as per A-9. If energy savings calculation performed for A-9, DO NOT duplicate for B-4.

Heating Energy Savings ______________ BTU/yr

Cooling Energy Savings ______________ BTU/yr

Total B-4 = ______________ BTU/yr

B-5. There is no insulation between conditioned and unconditioned spaces.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended.

63) None practical

Suggested Retrofits: Indicate recommended retrofits:

- Insulate between heated/cooled spaces and unconditioned or outside areas such as parking garages, porticos, storage areas, basements and attics. ☐

No calculation.

B-6. Doors and/or windows separating conditioned from non-conditioned areas (including outdoors) are left open.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

64) Post instructions. ☐

65) Assure that automatic door closers function properly. ☐

Potential Energy Savings Calculations for recommended O&M changes: ☐

Do calculations for B-1. Do not repeat if already done.

VENTILATION SYSTEM

V-1. An excessive quantity of outdoor air is used to ventilate the building.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended.

**66) Reduce outdoor air quantity to the minimum allowed by codes by adjusting outdoor air dampers during hours of occupancy. ☐

Suggested Retrofits: Indicate recommended retrofits.

- Replace old style dampers with new high quality, opposed-blade models with better close-off ratings. ☐

Potential Energy Savings Calculations for recommended Operational and Maintenance Changes:

A. Amount of outside air required by code for ventilation ________ CFM/person.

B. Average occupancy Item #19, page 4, Energy Audit __________.

C. Minimum percentage outside air brought into building, Item #34, page 8, Energy Audit ________%.

Heating Energy Savings: ((C x 10h) - (A x B)) x 1.08 x (3h-4h) x 2h x 7h =____

((_____ x _____) - (_____ x _____)) x 1.08 x (____ -____) x _____ x ______

= _______________ BTU/yr

Total V-1 = _______________ BTU/yr

V-2. Outdoor air intake dampers open when building is unoccupied.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

67) Close outdoor air dampers when building is unoccupied. Be sure dampers have proper seals and adjust to insure complete closure. ☐

*68) Where codes permit, close outdoor air dampers during first and last hours of occupancy to permit fast warm-up and cool-down. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Install controls which will automatically close dampers during unoccupied periods. ☐

Potential Energy Savings Calculations for recommended Operational and Maintenance Changes:

A. Estimate number hours building unoccupied when outside air dampers are open. __________hrs/wk.

Heating Energy Savings: (8h x 10h) x 1.08 x (3h - 4h) x A x 2h = _____

(_____ x _____) x 1.08 x (_____ - _____) x _____ x _____ = __________ BTU/yr

Total V-2 = __________ BTU/yr

V-3. Ventilation systems are not utilized for natural cooling capability.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

*69) Whenever possible, use outside air for cooling rather than using refrigeration. (Use economizer cycle, if available.) ☐

Suggested Retrofits: Indicate recommended retrofits:

- Install an economizer cycle with enthalpy control to optimize use of outside air for cooling. ☐

No calculation.

V-4. Exhaust system operation is not programmed.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

70) Discontinue use of unnecessary exhaust fans. ☐

*71) Re-wire toilet exhaust fans to operate only when lights are on. (Fans are often wired in reverse. Correct as needed.) ☐

72) Schedules should be established so exhaust fans run only when needed. ☐

73) Consider grouping smoking and areas with similar exhaust requirements together so they may be served by one exhaust system. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Install time clocks or other controls to shut exhaust system off when not needed (as permitted by code). ☐
- Install a rheostat in series with exhaust fan to modulate fan speed so no more than the necessary amount of air will be exhaused. ☐
- Install chemical or electronic odor or particulate remover to reduce the need for using outside air for ventilation. ☐
- Install controlled or gravity dampers on all exhaust ducts to close ducts when fan is not operating. ☐

Potential Energy Savings Calculations for recommended Operational and Maintenance Changes:

A. Horsepower rating of exhaust fans, Item #32a, page 8, Energy Audit ______H

B. Current annual exhaust fan useage (est.) ________hrs/yr.

C. Adjusted annual exhaust fan useage (est.) ________ hrs/yr.

Power Savings: .75 x A x (B-C) = ______________

.75 x ________ x (________ - ________) = ______________ KWH/yr

Total V-4 = ______________ KWH/yr

V-5. Return, outdoor air and exhaust dampers are not sequencing properly.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended.

74) Adjust damper linkage. ☐

75) Be sure damper motors are operating properly. ☐

76) Readjust position indicators to accurately indicate damper positions. ☐

77) Reset linkage, repair or replace dampers if blades do not close tightly. ☐

78) Close all outdoor air intake dampers when equipment is shut off and when building is unoccupied. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Replace old style dampers with new high quality opposed-blade models with better close-off ratings. ☐

No calculation.

V-6. During heating season, temperature of air flow to space feels too cold.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

79) Raise supply temperature to a minimum of 60°F in interior zones and 65°F in perimeter zones during winter. Be sure to lower the supply temperature to 55°F during the cooling season. (Check local codes.) ☐

* 80) Reduce air volume to prevent a draft effect during heating season. ☐

Suggested Retrofits:

None Practical

No calculation.

V-7. Air flow to space feels unusually low or is inconsistent from one space to another.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

81) Utilize ductwork access openings, look for any obstructions such as loose hanging insulation (inclined ducts), loose turning vanes and accessories, and closed volume and fire dampers. Adjust, repair or replace as necessary. ☐

82) Inspect all room air outlets and inlets--diffusers, registers and grills. They should be kept clean and free of all dirt and obstructions. Clean and remove obstructions as necessary. ☐

83) Clean or replace dirty or ineffective filters on a regular basis. ☐

84) Post signs instructing occupants not to place objects where they will obstruct air flow. ☐

*85) Consider rebalancing system. ☐

86) Remove access covers and inspect turning vanes, fire damper and splitters. ☐

Suggested Retrofits:

None practical.

No calculation.

V-8. Air filters and heating/cooling coils do not receive scheduled maintenance.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

87) Develop maintenance schedule. ☐

88) Install filter pressure drop guages. ☐

No calculations.

V-9. Air leaks from ducts and plenums are noticable.

Condition Exists ☐

Condition doesn't Exist ☐

89) Repair leaks. ☐

No calculation.

V-10. Fan drive belts deflect excessively. (Assure fan motor circuit is locked before testing.)

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

90) Adjust fan belt tension. ☐

No calculation.

HEATING SYSTEM

H-1. Multiple boilers or heater fire simultaneously.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

91) Adjust controls so boiler #2, for example, will not fire until boiler #1 no longer satisfies the demand. ☐

Suggested Retrofits: Indicate recommended retrofits:

Purchase and install automatic staging controls if applicable. ☐

No calculations.

H-2. Stack temperature appears excessively high -- (greater than 100°F plus boiler's air, steam or water temperature). Note: For every 10° above stack temperature you waste 1% of the fuel used in your boiler.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

*92) Insure proper amount of air for combustion is available in furnace room. ☐

93) Examine and clean air intake filters. ☐

*94) Perform flue gas analysis on a regular basis to insure proper air to fuel ratio.

*95) If furnace is over-firing, verify that reports, gas orifus and/or nozzles are properly sized. Also check that fuel pressures are not too high. ☐

NOTE: Checks and maintenance of boiler operations should be performed by qualified personnel. If there is no one on the staff of the institution, consider hiring a service contractor or contact your utility company.

Suggested Retrofits: Indicate recommended retrofits:

- Purchase kit for flue gas analysis if frequent testing is anticipated. ☐

No calculations.

H-3. Water in heating system is heated when there is no need.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

96) Turn off boiler, pumps or heat source. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Install control to automatically shut down heat generating device when outside air temperature reaches 60°F. ☐

No calculations.

H-4. Space temperatures are higher or lower than thermostat settings.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

*97) Recalibrate thermostat. ☐

*98) Blow out moisture, oil and dirt from pneumatic lines (for pneumatic systems). Clean contacts if control system is electrical. ☐

*99) Recalibrate controllers. ☐

*100) Insure control valves and dampers are modulated properly. ☐

*101) Insure heat generating device is producing heat and heat distribution to the space is unobstructed. ☐

*102) Make sure air intake volume is not excessive. ☐

Suggested Retrofits: Indicate recommended retrofits :

- For electric control systems, install pre-set solid state thermostats which do not require calibration. ☐

Potential Energy Savings Calculations for recommended Operational and Maintenance Changes:

A. Gross area where the temperatures are higher than the thermostat settings ___________ square feet

B. Actual space temperature _________ degrees

C. Thermostat setting _________ degrees

D. Hours per week at the thermostat setting (C)_____________

Heating Energy Savings: 1h x ((B-C) ÷ (B-4h)) x (D ÷ 168) x (A ÷ 5h) = _______

_____ x ((_____ - _____) ÷ (_____ - _____)) x (_____ ÷ 168) x (_____ ÷ _____) =

____
BTU/yr (KWH/yr)

Total H-4 = _______________
BTU/yr (KWH/yr)

H-5. Heating system hot water temperature feels excessively hot during periods of mild weather.

Condition Exists ☐
Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

*103) Experiment with hot water temperature reduction until an acceptable comfort level is reached. ☐

*104) Make sure reset controls work properly. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Purchase and install automatic temperature controls to schedule heating water temperature according to outside temperature. ☐

No calculations.

H-6. Condensate from street steam is being discharged to sewer drain.

Condition Exists ☐
Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

105) None Practical

Suggested Retrofits: Indicate recommended retrofits:

- Install pump to return condensate to boiler or return condensate by gravity if possible. Condensate also can be used to heat domestic water or boiler combustion air prior to its return to the boiler feedwater system. ☐

No calculations.

H-7. Heating pilot lights are on during cooling season.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

*106) Turn pilots off. (Enter shut-off and turn-on dates in your log book and post a notice in the boiler/furnace room.) ☐

Suggested Retrofits: Indicate recommended retrofits:

- Replace worn units with new electronic ignition models to avoid unnecessary fuel consumption. ☐

Potential Energy Savings Calculations for recommended Operational and Maintenance Changes:

A. Number of pilot lights to be shut off ________

B. Annual heating BTUs (see Table 8 , page 12) ____________

C. Hours per year pilot lights can be shut off _________

D. Hours per year in operation (Table 1, page 5) __________

Energy Savings: A x (B x .10 x (C ÷ D)) = ________________

_____ x (_____ x .10 x (_____ ÷ _____)) = ______________ BTU/yr

Total H-7 = __________ BTU/yr

H-8. Duct insulation or steam, condensate and heating water piping in disrepair or missing.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

107) Inspect pipes for broken or missing insulation. Repair or replace and protect as needed. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Install additional pipe insulation in accordance with design specifications and energy conservation codes. ☐

No calculations.

H-9. Operation of oil burner or combustion device is accompanied by excessive smoke and soot. Boiler combustion efficiency is not tested on a scheduled basis.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

*108) Inspect burner nozzles for wear, dirt and incorrect spray angles. Clean and adjust as necessary. ☐

*109) Verify that oil is flowing freely and oil pressure is correct. ☐

*110) Perform flue gas analysis to set proper air to fuel ratio. ☐

111) Prepare testing schedule log for test results.

Suggested Retrofits: Indicate recommended retrofits:

Purchase kit for flue gas analysis if frequent testing is anticipated. ☐

No calculations.

H-10. Burner short-cycles.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

112) Hot water temperature limit switch may be set too low. Reset as required. ☐

113) Thermostat may be faulty. Replace if necessary. ☐

Suggested retrofits:

None Practical.

No calculations.

H-11. Boilers are not maintained on a scheduled basis.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

114) Perform maintenance per manufacturers instructions. ☐

No calculations.

H-12. Steam, hot or chilled water leaks are evident.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended: ☐

115) Repair leaks.

No calculations.

H-13. Steam, hot or chilled water valves do not shut off tight.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended: ☐

116) Repair or replace valve,

No calculations.

COOLING SYSTEM

C-1. Space temperature is higher or lower than thermostat setting.

Condition Exists ☐
Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

117) Re-calibrate space thermostat. ☐

118) Blow out moisture, oil and dirt from pneumatic lines on pneumatic control system. Clean contacts on electric control system. ☐

119) Re-calibrate controllers. ☐

120) Verify that control valves and dampers modulate properly, especially the economizer cycle. ☐

Suggested retrofits: Indicate recommended retrofits:

- For electric control systems install pre-set, solid state thermostats which do not require calibration. ☐

Potential Energy Savings Calculations for recommended Operational and Maintenance Changes:

A. Gross area where the temperatures are lower than the thermostat settings __________square feet

B. Actual space temperature __________ degrees

C. Thermostat setting __________ degrees

D. Hours per week at the thermostat setting (C) __________

Cooling Energy Savings: 1c x ((C-B) ÷ (4c-B)) x (D ÷ 8c) x (A ÷ 5c) = ______

_____x ((_____-_____) ÷ (_____-_____)) x (_____ ÷ _____) x (_____ ÷ _____)

= ______________________

BTU/yr (KWH/yr)

Total C-1 = ______________________
BTU/yr (KWH/yr)

C-2. Chiller is operating during cold weather to provide air conditioning.

Condition Exists ☐
Condition doesn't Exist ☐

Suggested O&M: Check O&M's that are recommended:

121) None Practical ☐

Suggested Retrofits: Indicate recommended retrofits:

- Provide a water interchange system injecting cooling tower condenser water directly into the system's chilled water circuits. Except for pumping and cooling tower fan horsepower, this provides "free" cooling. Special care must be taken in treating and filtering condenser water. ☐

- If system is forced air, using DX coils and air cooled condenser, install economizer cycle to obtain free cooling. ☐

No calculations.

C-3. Reheat coils are used to maintain zone temperatures.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

*122) Lower hot water temperature. ☐

*123) Raise chilled water temperature. This will result in higher supply air temperatures to space. ☐

124) During summer months, turn hot water flow off by shutting valve at reheat coil or by turning off hot water circulating pump. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Convert to variable air volume system if the reheat coils are not necessary to supply heat during the heating season. ☐

No calculations.

C-4. Multiple air conditioning compressors start at the same time.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

125) Adjust electric controls to stage compressor operation properly. Isolate unneeded chillers. ☐

126) Develop load vs. capacity matrix. ☐

Suggested Retrofits: Indicate recommended Retrofits:

- Should automatic controls not exist, purchase and install. This will allow compressor #2, for example, to cut in when compressor #1 can no longer satisfy air conditioning load. ☐

No calculations.

C-5. Building utilizes a dual duct or multizone system.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

127) Lower hot deck temperature. ☐

128) Raise cold deck temperature. ☐

129) During summer months, turn heating source off. ☐

130) If unit has an economizer cycle, turn mechanical cooling off in winter. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Convert dual duct or minimize systems to variable air volume, if building has a separate heating system. ☐
- Install controls to automatically reset hot and cold deck temperatures. ☐

No calculations.

C-6. Insulation on cooling line pipes and ducts appears inadequate.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

131) Repair or replace damaged insulation. Provide protection where needed. ☐

Suggested Retrofits: Indicate reommeded retrofits:

- Insulate all delivery lines and ducts in accordance with recommended R-values. ☐

No calculations.

C-7. Air conditioning load trips circuit breaker on extremely warm days.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

*132) Tighten wire lugs if loose. ☐

*133) Replace defective circuit breakers. ☐

134) Clean condenser on air cooled systems. ☐

*135) Clean scale build-up in condenser on water cooled systems. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Consider installing insulated underground storage tank that would allow night operation of chiller when electrical demand is low. This reservoir tank would be a source of supply of chilled water for daytime operation. Chiller would not be operated during the day. ☐

No calculations.

C-8. Air of inadequate volume or temperature is being discharged through grilles, and the space temperature cannot be maintained.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

136) Defrost evaporator coil if iced. Determine cause of icing and correct. ☐

137) Clean evaporator coil, fins and tubes. ☐

138) Clean or replace air filters. ☐

139) Fire damper may be closed. Open and replace fusible link if necessary. ☐

140) Balancing damper may have slipped and closed. Open to correct position and tighten wing nut. ☐

*141) If fan is rotating backwards, reverse rotation by reversing electrical contacts. ☐

142) Clean condenser coil and/or water tower nozzles. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Install differential pressure-sensing switches to trip alarm when air flows drop significantly. ☐

No calculations.

C-9. Refrigeration condensers or coils are dirty, clogged and/or not functioning efficiently.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

143) Determine if normal operating temperatures and pressures have been identified and if all gauges are checked frequently to insure design conditions are being met. ☐

*144) Increased system pressure may be due to dirty condensers which decrease system efficiency. High discharge temperatures often are caused by defective or broken compressor valves. Repair or adjust as required. ☐

145) Inspect the liquid line leaving the strainer. If it feels cooler than the liquid line entering the strainer, it is clogged. It is very clogged if frost or sweat is visible at the strainer outlet. Clean as required. ☐

146) Clean coils and/or other elements as needed on a scheduled basis. Include dehumidification coils. ☐

Suggested Retrofits:

- None Practical ☐

Potential Energy Savings Calculations for recommended Operational and Maintenance Changes:

Clean condenser coils or tubes - assume 10 percent savings

Cooling Energy Savings: .10 x 1c = ______

.10 x ________ = ______________
BTU/yr (KWH/yr)

C-10. Chilled water piping, valves and fittings are leaking and/or valves do not shust off tight.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

147) Repair joint or piping leaks. ☐

148) Repair or replace valves. ☐

Suggested Retrofits:

- None Practical ☐

No calculations.

C-11. Refrigeration compressor runs continually. (Direct expansion system).

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommeded:

*149) Contacts in starter circuits of controls may be worn. Repair and replace as necessary. ☐

*150) Bubbles in eight glass indicate low refrigerant charge. Repair leaks and recharge. ☐

*151) Refrigerant charge may be too high. Check discharge pressure and purge excess. ☐

*152) Compressor valves may be leaking. Overhaul compressor. ☐

*153) Liquid line solenoid valve may be stuck open. Repair or replace. ☐

Suggested retrofits: Indicate recommended retrofits:

- Load may be greater than design. Consider replacing with chiller and water cooled condenser system. ☐

No calculations.

C-12. Circulating pump operation is manually controlled.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

154) Develop operating schedule. ☐

No calculations.

C-13. Condensers and cooling towers are not maintained on a scheduled basis.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

155) Prepare maintenance schedule. Perform maintenance per manaufacturer's recommendation. ☐

156) Maintain cooling tower water ☐

No calculations.

C-14. Chiller evaporating and condensing temperatures are not optimized.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

157) Increase chiller evaporator temperature following manufacturer's recommendations. ☐

158) Decrease chiller condensing temperature following manufacterer's recommendations. ☐

No calculations.

WATER HEATING SYSTEMS

W-1. Storage tanks, piping and water heaters are utilized inefficiently.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

159) Replace damaged or missing insulation. Repair. Protect as necessary. ☐

160) Reduce hot water temperature to 105°-115° for general purposes. Consult appropriate codes and regulations for permissible water temperatures for sanitation health, and medical purposes. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Install insulation on all hot water lines and storage tanks. ☐
- Install a small domestic hot water heater to maintain desired temperature in water storage tank. This could eliminate the need for operating one of the large space heating boilers during summer months. ☐
- Install de-centralized water heating. ☐

Potential Energy Savings Calculations for recommended Operational and Maintenance Changes:

A. Existing hot water temperature, Item 35 i, page 9, Energy Audit ____°F.

B. Recommended hot water temperature setting ________°F.

C. Estimated annual consumption, Item 35h, page 9, Energy Audit ______gal/yr.

Energy Sagins: (A-B) x 8.3 x C = __________

(_____-_____) x 8.3 x__= __________ BTU/yr

Total W-1 = _____________ BTU/yr

W-2. Drips or leaks are evident in hot water systems and/or valves do not shut off tight.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

161) Repair all leaks including those of the faucets and pumps. ☐

162) Repair or replace valve. ☐

Suggested Retrofits: Indicate recommended retrofits:

- None Practical

No calculations.

W-3. Electric water heater has no time restrictions on heating cycle. Water temperatures are not reduced during unoccupied periods.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

163) Utilize "vacation cycle" on water heater when not needed during extended periods. NOTE: Complete deactivation could cause leaks. Schedule set-backs (either manually or with existing time clock) consider schedule's impact on electrical demand. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Limit the duty cycle with a time clock or other control devices to avoid adding the water heating load to the building during peak electrical demand periods. (Additional hot water storage capacity may be required.) ☐

No calculation.

W-4. Devices to conserve heated water have not been utilized where practical.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

164) None Practical

Suggested Retrofits: Indicate recommended retrofits:

- Inatall mixing valves. ☐
- Replace standard faucets with self-closing, flow restrictor types. (Highly mineralized water or water containing sediment can cause blockages.) ☐
- Install a solar water heater to assist in meeting building hot water demand. This can reduce consumption of traditional non-renewable energy fuels in facilities that require large quantities of hot water. ☐

No calculations.

W-5. Heat pump water heater coils are not maintained on scheduled basis.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's; Check O&M's that are recommended:

165) Schedule maintenance following manufacturer's recommendations. ☐

No calculations.

W-6. Hot water recirculating pumps run continuously.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

166) Develop operating schedule to match occupancy. ☐

No calculations.

SPECIAL SYSTEMS

S-1. Kitchen equipment not used effectively.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

167) Cook with lids in place on pots and kettles. ☐

168) Preheat ovens only for baked goods. ☐

169) Reduce temperature or turn off frying tables and coffee urns during off peak periods. ☐

170) Provide ovens and fryers with loads all of the time they are heated and on. ☐

171) Use dishwashers for full loads only. ☐

172) Shut down exhaust hood fans when not required.

173) Use microwave ovens for small orders.

Suggested Retrofits: Indicate recommended retrofits:

- Consider using a heat recovery system. ☐

No Calculations.

S-2. In-house laundry equipment not used effectively.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

174) Develop concise operating procedures for each piece of equipment. ☐

175) Iron only items which require it. ☐

176) Wash and dry full loads only. ☐

177) Consider rescheduling laundry work hours to avoid periods when building experiences its peak electrical load if electricity demand charges are significant. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Consider using heat recovery. ☐

No calculations.

S-3. Special diagnostic and treatment equipment not used effectively.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

178) Periodic update on operation of equipment by equipment manufacturer's representative. ☐

179) Reduce start-up and shut-down times. ☐

180) Consider scheduling this equipment during electrical off-peak periods. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Consider using heat recovery. ☐

No calculations.

S-4. In-house computer systems adding to peak demand.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

181) Periodically update on operation of equipment by manufacturer's representative. ☐

182) Check cooling air temperatures for computer to confirm correct temperatures. ☐

183) Minimize air leakage in and out of computer area. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Consider using heat recovery. ☐

No calculations.

S-5. Swimming pool water temperature too high. Circulating pumps run continually.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

184) Reduce water temperatures to 80°-84°F if users can accept it. ☐

185) Indoor pool: turn off heater and circulating pumps until an hour before use. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Outside pool: cover when not in use. ☐
- Use pool as part of heat recovery scheme and/or solar system. ☐

No calculations.

S-6. Elevators running too often.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

186) Reduce the number of elevators in service during hours when majority of persons are not leaving or entering the building. ☐

187) Turn off the motor-generator set in the elevator machine room when not in use: nights, weekends, holidays, and slack periods during the day. ☐

188) Reduce speed of elevator. ☐

Suggested Retrofits: Indicate recommended retrofits:

- Consider changing from motor-generator to a more efficient solid state controller. ☐

No calculations.

S-7. Building has extended occupancy areas such as computer rooms.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended

189) Isolate these spaces (including related support services such as restrooms and break areas) from the portion of the building having fewer operating areas. ☐

No calculations.

POWER

P-1. Transformers remain energized when serving no load for extended periods.

Condition Exists ☐

Condition Doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

190) Disconnect transformer. ☐

No calculations.

P-2. Transformer ambient temperature is high.

Condition Exists ☐

Condition Doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

190) Assure that forced ventilation system serving space is functional or that natural ventilation system openings are not obstructed. ☐

No calculations.

P-3. Vending machines remain energized during unoccupied periods.

Condition Exists ☐

Condition Doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

192) Provide manual operation schedule or connect to existing time clock is practical. Consult with vending company prior to implementation. ☐

No calculations.

P-4. Refrigerator drinking fountains or recirculating chilled drinking water systems are not controlled for occupancy.

Condition Exists ☐

Condition Doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

193) Develop schedule for manual control or connect to existing time clocks or programmable controllers if practical. ☐

P-5. Elevator operation is not optimized for occupancy variations.

Condition Exists ☐

Condition Doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

194) Consult with manufacturer for possible operating changes. ☐

No calculations.

P-6. Lubricants used on major rotating equipment with high load factors have not been optimized for reduction of friction losses.

Condition Exists ☐

Condition Doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

195) Consult with equipment manufacturers and lubricant manufacturer to determine if lubricant change is cost-effective. ☐

No calculations.

P-7. Substantial electricity demand changes are incurred.

Condition Exists ☐

Condition Doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

196) Determine if use of major electrical equipment can be scheduled to reduce demand. ☐

No calculations.

REFRIGERATION

R-1. Evaporator coils have heavy ice build-up.

Condition Exists ☐

Condition doesn't Exist ☐

Suggest O&M's: Check O&M's that are recommended:

197) Defrost coils regularly. ☐

198) Determine if automatic defrost system is improperly adjusted or defective. ☐

199) Determine if air is leaking into refrigerated area from defective door gaskets or poorly sealed wiring or piping penetrations. ☐

No calculations.

R-2. Evaporator temperature is lower than required for produce or process.

Condition Exists ☐

Condition doesn't Exist ☐

Suggest O&M's: Check O&M's that are recommended:

200) Increase temperature set point. ☐

No calculations.

R-3. System insulation is damaged or missing.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended.

201) Repair and replace. Protect vulnerable sections from future damage. (Do not insulate hot gas piping unless required for safety.) ☐

No Calculations.

R-4. Condensing temperature is excessive.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

202) Reset following manufacturer's recommendations. ☐

203) Clean condensing fins or tubes. ☐

204) Assure that ventilation for compressor rooms is adequate. ☐

No calculations.

R-5. Ice-makers are not turned off during extended unoccupied periods.

Condition Exists ☐

Condition doesn't Exist ☐

Suggested O&M's: Check O&M's that are recommended:

205) Develop schedule for manual operation. ☐

No calculations.

USE THIS SPACE FOR 1) Make any comments on operation and maintenance changes recommendations. 2) Draw a rough sketch of the building floor plan.

---

*An asterisk (*) means that the implementation of the suggested "O&M," if checked, may require special training for maintenance or operating personnel.

** A double asterisk means that the Bonneville Power Administration recommends the measure not be implemented until a methodology to calculate threshold ventilation rates to avoid adverse impacts to indoor air quality has been developed.

PART III: ENERGY AUDIT ESTIMATED ANNUAL COST SAVINGS SUMMARY

NOTE: The savings determined in this summary can only occur through diligent implementation of the recommended operational and maintenance changes identified in Part II, Option B of this Workbook!

Page 50 is a summary of estimated savings. Transfer the estimated savings from each formula you worked in the checklist. Be sure to put BTUs and KWHs under the correct column. Next total each section - Administration, Lighting, etc., - and transfer these figures to the table on page 51.

$/year for the table on page 51 can be found by dividing total cost of the energy (from page 6) by energy used (from page 6) then multiplying by estimated energy savings (page 51).

For instance:

KWH estimated cost savings =

Total KWH Cost (Table 2, page 6) ÷ Total KWH (Table 2, page 6)

x Total Estimated KWH Savings (Table 11, page 51).

SUMMARY OF ESTIMATED ANNUAL COST SAVINGS (Reference Part II, Option B)

Insert values determined as a result of O&M Calculations

Administration	SAVINGS	
	BTU/yr	KWH/yr
A-1		
A-2		
A-3		
A-4		
A-5		
A-6		
A-7		
A-8		
A-9		
A-10		
A-11		
A-12		
Total Admin.		

Lighting		
L-1		
L-2		
L-3		
L-4		
L-5		
L-6		
L-7		
L-8		
Total Lighting		

Building Envelope		
B-1		
B-2		
B-3		
B-4		
B-5		
B-6		
Tot.Blg. Env.		

Ventilation	SAVINGS	
	BTU/yr	KWH/yr
V-1		
V-2		
V-3		
V-4		
V-5		
V-6		
V-7		
Total Vent.		

Heating		
H-1		
H-2		
H-3		
H-4		
H-5		
H-6		
H-7		
H-8		
H-9		
H-10		
Total Heating		

Special Systems		
S-1		
S-2		
S-3		
S-4		
S-5		
S-6		
Total Spec. Sys.		

Water	SAVINGS	
	BTU/yr	KWH/yr
W-1		
W-2		
W-3		
W-4		
Total Water		

Cooling		
C-1		
C-2		
C-3		
C-4		
C-5		
C-6		
C-7		
C-8		
C-9		
C-10		
C-11		
Total Cooling		

Take the totals for each energy using system listed on the previous page and transfer them to the following savings summation table and total the columns.

Table 11 SUMMATION

	Non-Electric		Electric		TOTAL
ITEM	BTU/yr	$/yr	KWH/yr	$/yr	$/yr
ADMINISTRATION					
LIGHTING					
BUILDING ENVELOPE					
VENTILATION					
HEATING					
COOLING					
WATER					
SPECIAL SYSTEMS					
TOTALS	(a)	(b)	(c)	(d)	(e)

f. Total Annual BTU (Table 3 page 6) = ____________

g. Total Annual Cost (Table 3 page 6) = ____________

h. Total Square Footage of Building (Page 4, #15) = ________

Insert the above values (a to h) in the formulae below. The values derived from these formulae are only estimates of savings to be made by implementing operational and maintenance changes.

1-a. BTU/yr savings = a + (3413 x c) = __________ BTU/yr savings.

__________ + (3413 x ________) = __________ BTU/yr savings.

1-b. Annual Percent Savings = BTU/yr Savings ÷ f x 100 = __________% Savings

__________ ÷ __________ x 100 = __________% Savings

1-c. BTU/sq.ft./yr Savings = BTU/yr Savings ÷ h = __________ BTU/sq.ft./yr

__________ ÷ __________ = __________ BTU/sq.ft./yr

2. Annual Percent Dollar Savings = e ÷ g x 100 = __________% $ Savings

__________ ÷ __________ x 100 = __________ % $ Savings

Find the ultimate BTU savings realizable from page 12. If the figure from formula 1-a exceeds the BTU/yr savings from page 12, there has been an overstatement of BTU/yr savings. This is due to interaction between O & M's. The figure from page 12 is an estimate of total potential savings, but does not take human error into account. Since human error cannot be avoided, you can plan on saving somewhat less than the amount from page 12.

PART IV: EVALUATION OF POTENTIAL FOR ENERGY CONSERVATION MEASURES

This evaluation is patterned on the 1976 ASHRAE Systems Handbook, Chapter 1 and the Energy Audit Procedures published by the Ohio Board of Regents in June, 1978. A Relative Importance Factor (RIF), ranging from 15 to 35 is assigned to each of the five items listed. Within each, conditions are described and a Weighting Factor (WF) assigned to each condition. The evaluation of the potential of the building for energy conservation measures is based on the sum of the products of the RIFs and WFs. The higher this value, the greater the potential for energy savings. Since energy audits are intended to make relative comparisons, it is essential that conformity be maintained. Therefore, neither the RIF nor the WF are to be altered. Determine the Weighting Factor as follows:

a. Building Envelope (RIF:15)

Percentage of glass area can be estimated by dividing the glass area in a typical wall by the total wall area, Energy Inventory, #17, page 4, tight fitting doors and windows denote low infiltration and loose fit-up denote high infiltration. (Circle one)

	WF
Buildings over 40% glass and large infiltration	1.0
Buildings over 40% glass	.9
Buildings with large infiltration	.8
Buildings under 40% glass	.7
Buildings with low infiltration	.6
Buildings under 15% glass	.5

b. Lighting (RIF:15)

To determine power usage for lighting in watts/square foot, add the wattage of all lamps in the building and divide by the gross floor area of the building, Energy Inventory, #15, page 4. (Circle one)

	WF
Lighting over 3 w/Sq Ft	1.0
Lighting 2 or 3 w/Sq Ft	.9
Lighting 1 to 2 w/Sq Ft	.8
Lighting reduced by changes in switching	.7
Lighting that cannot be reduced	.6

c. HVAC System Type (RIF:35)

Check the type of HVAC system found in your building. If knowledge of the system is not available, obtain information from the mechanical engineer, blueprints, specifications, or a local HVAC contractor. (Circle one)

	WF
Reheat or Dual Duct	1.0
Multizone or Induction Units	.9
Rooftop Units, Wall Units, or Unit Ventilators	.8
Fancoil, VAV, or Heat and Vent System	.7
Radiation, Unit Heaters (no fan system)	.6

d. Outside Air (RIF:20)

Check the ventilation system for outside air percentage. If knowledge of the system is not available, obtain the information from the mechancial engineer, blueprints, specifications, or a local HVAC contractor. (Circle one)

	WF
75 to 100% Outside Air	1.0
50 to 75% Outside Air	.9
25 to 50% Outside Air	.8
10 to 25% Outside Air	.7
Infiltration, toilet exhausts only	.6

e. Fan Energy (RIF:15)

To determine square feet per fan horsepower (HP), divide building gross floor area by total HP of all HVAC and ventilating fans in the building. HP rating can be found on nameplates of fan motors in your air handling systems, or from blueprints and specifications, p. 8, #32c. (Circle one)

	WF
Under 700 Sq Ft per fan HP	1.0
200-600 Sq Ft per fan HP	.9
600-1000 Sq Ft per fan HP	.8
1000-1500 Sq Ft per fan HP	.7
1500-2000 Sq Ft per fan HP	.6
Over 2000 Sq Ft per fan HP	.5

Complete the following table to determine the energy conservation measure potential index:

	RIF	x WF	= EVALUATION
a. Bldg Envelope - % Glass and infiltration	15		
b. Lighting Levels	15		
c. HVAC System Type	35		
d. Ratio Outside Air	20		
e. Fan Energy	15		
Energy conservation measure potential index:			

PART V: EVALUATION OF POTENTIAL FOR SOLAR AND RENEWABLE RESOURCE MEASURES

A. AVAILABLE INSOLATION (RIF:30)

Available insolation (received solar radiation) is a function of both geopraphical location on site characteristics.

Determine the average annual daily horizontal insolation received at the site from information provided from National Weather Service data.

Determine by observation the building or site's shading characteristics. A building is considered "shaded" if 50 percent or greater of its roof and south facing walls are shaded for more than four hours per day.

Observe if there is open, unshaded land adjacent to the building, (Circle one)

	WF
greater than 1300 BTU/(Ft^2/Day) and unshaded	1.0
less than 1300 BTU/(Ft^2/Day) and unshaded	.6
greater than 1300 BTU/(Ft^2/Day) and shaded	.2
less than 1300 BTU/(Ft^2/Day) and open land	.8
less than 1300 BTU/(Ft^2/Day) and shaded	.5

If unshaded open land such as fields, yards, parking areas etc. is available within the immediate vicinity of the building, list the approximate square footage of these areas:______________________________.

If more than half of the building's roof area or southern facing wall surface is heavily shaded by trees, buildings or other obstructions, enter the number of hours per day that these areas are shaded_________.

B. TYPE OF FUEL (RIF:20)

Determine the type(s) of fuel used for space heating and domestic hot water. (Circle one)

	WF
total electric heat and hot water	1.0
oil or gas heat, electric hot water	.8
coal heat, electric hot water	.5
oil or gas heat and hot water	.6
coal heat and hot water	.2

C. GENERAL BUILDING CHARACTERISTICS (RIF:10)

Observe the shape of the building and the horizontal or vertical distance between a potential solar installation and the primary heating, cooling and domestic hot water conversion equipment.

An "excellent" building is one which is square or rectangular; has an apparent sufficient area for a solar installation; and the location of the primary equipment is within 50 feet of an intended solar installation.

A "good" building is one whose shape would add to the complexity of a solar installation (i.e., H shape, E shape, etc.), but has sufficient available space for solar and the primary equipment is located within 50 feet of an intended installation.

A "fair" building is one in which the shape adds complexity to a solar installation, the available space is limited and the primary equipment is located within 75 feet of the solar installation.

A "poor" building is one which adds extreme complexity to an installation, available free space is limited and the primary conversion equipment is scattered and located greater than 75 feet from an intended solar installation. (Circle one)

	WF
excellent	1.0
good	.8
fair	.5
poor	.2

D. ROOF CHARACTERISTICS (RIF:10)

Observe the roof characteristics: pitch, orientation, construction materials, structural members and roof top obstructions.

An "excellent" roof is one which is flat or pitched and south facing; the roofing materials are durable and easily worked; the structural members have sufficient capacity to support additional weight; and is free of obstructions that would hinder installation or cause shading.

A "good" roof is one which is flat or pitched facing within 20° east or west of south, with minor roof obstructions but otherwise having the same characteristics as an "excellent" roof.

A "fair" roof is one that meets the "good" roof criteria but requires minor structural rework.

A "poor" roof is one which has many interfering and shading roof obstructions; a non-south oriented pitched roof; or requires major structural reinforcement. (Circle one)

	WF
excellent	1.0
good	.8
fair	.5
poor	.2

E. WALL CHARACTERISTICS (RIF:20)

Determine the glass area of the south facing walls as a percentage of the total south wall area and determine the predominant type of solid wall construction material. (Circle one)

PART VI: AUDITOR CERTIFICATION FORM

1. I, (please print) ______________________________, am qualified to perform energy audits in conformance with the requirements of the Montana Institutional Buildings Grants Program by the successful completion of an energy auditor training program conducted by the Montana DNRC Energy Division on (dates of training session)____________________.

2. I conducted the energy audit as a:

☐ staff member of an eligible institution.
☐ representative of an association of eligible institutions.
☐ licensed engineer or architect.
☐ Other (attended the Workshop)

3. My financial interests in connection with this energy audit are:

☐ no outside interests.
☐ own or am employed by:
  ☐ a consulting firm.
  ☐ an equipment manufacturer or supplier.
  ☐ an energy suppler.
  ☐ other (specify)____________________

4. I have completed this energy audit workbook accurately and thoroughly to the best of my knowledge and abilities.

5. I have no responsibility for the day-to-day operation of the building.

6. I have reviewed the energy audit with the administrator of the institution and have explained to him/her the following:

a. I have walked through the building with him/her and have identified each O&M measure identified as existing in the energy audit.

b. I have left with the administrator one complete copy of the energy audit with instructions that he/she is to sign and date, on the Worksheet Part 2 Option B, each O&M as they are implemented. Or, if not implemented, he/she must state in writing why an O&M cannot be implemented (see Part VII).

c. Upon application for Technical Assistance the administrator is to include a copy of O&Ms signed and dated when implemented.

d. I have calculated the estimated annual energy and energy costs savings that may be realized by implmenting each O&M.

e. I have advised the administrator on the affect on energy and cost savings that may be realized by implementing O&Ms per the energy audit.

7. ______________________________ ____________
Signature Date

______________________________ ____________
Address Phone Number

	WF
over 75% glass and masonry	1.0
over 75% glass and aluminum or metal	.7
over 75% glass and wood or other	.6
25% to 75% glass and masonry	.7
25% to 75% glass and aluminum or metal	.6
25% to 75% glass and wood or other	.4
under 25% glass and masonry	.5
under 25% glass and aluminum or metal	.3
under 25% glass and wood or other	.2

F. Determine the average monthly wind speed using data either supplied by the state, obtained from the National Weather Service or from local records. Also notice if there are any upwind or downwind natural or man-made barriers, located in the general vicinity of an intended wind equipment installation, in which the ratio of the height of the barrier to the distance from the intended installation exceeds 0.15. (Circle one)

	WF
15 mph or greater and less than 0.15 ratio	1.0
10-15 mph and less than 0.15 ratio	.8
less than 10 mph and less than 0.15 ratio	.6
15 mph or greater and greater than 0.15 ratio	.5
10-15 mph and greater than 0.15 ratio	.3
less than 10 mph and greater than 0.15 ratio	.1

EVALUATION OF POTENTIAL FOR SOLAR AND RENEWABLE RESOURCE MEASURES

	RIF	X	WF	=	EVALUATION
A. Available Insolation	30	x	____	=	________
B. Type of Fuel	20	x	____	=	________
C. General Building Characteristics	10	x	____	=	________
D. Roof Characteristics	10	x	____	=	________
E. Wall Characteristics	20	x	____	=	________
F. Wind Data	30	x	____	=	________
			TOTAL		________

PART VII: WORKBOOK MAILING INSTRUCTIONS

1. Have you fully completed the Building Energy Consumption Inventory?

2. Have you fully completed Part II -- Option A (Achieved Energy Savings Computation) or Part II -- Option B (Energy Audit Checklist)? One or the other must be completed. If you have shown a 20 percent savings under Option A, make sure all the O&Ms and Retrofits used to accomplish the savings are listed.

3. Is the Auditor Certification Form, Part VI, completely filled out and signed by a qualified auditor? This is a program requirement.

4. Photocopy Pages 3 through 57 of the workbook and mail two copies to:

   Institutional Buildings Grants Program (IBGP)
   Montana DNRC Energy Division
   32 South Ewing
   Helena, MT 59601

* *

In the Department of Energy memo #17 of January 4, 1980, three acceptable reasons for not implementing O&Ms were identified as follows:

(1) The O&M procedure proved not to be feasible:

(2) The O&M would cost more to implement than an institution could be expected to accomplish as an O&M; or

(3) The O&M involved ordering materials which had not yet arrived.

The Department of Energy will not accept a broad categorical statement such as "We have not implemented O&Ms because of a shortage of available funds." or "Our board will consider O&Ms in the future."

The federal Department of Energy regulations require that all O&Ms identified as existing in an EA or a TA analysis be implemented prior to submitting an application for additional assistance.

* *

____________________ Date Energy Audit mailed to IBGP

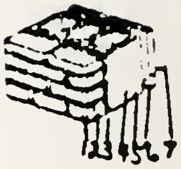
____________________ Date Operational and Maintenance checklist mailed to IBGP

____________________ Date Vendor Invoice request for EA payment mailed to IBGP

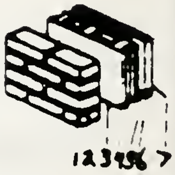
U-VALUES FOR TYPICAL WALL & ROOF CONSTRUCTION

WALLS

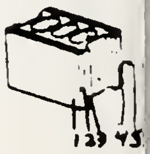
Construction	Resistance (R)
1. Outside surface (15 mph wind)	0.17
2. Face Brick (4 in.)	0.44
3. Cement mortar (1/2 in)	0.10
4. Concrete block (cinder agg.)(8 in.)	1.72
5. Air space[b] (reflective)	2.80
6. Gypsum wallboard. Foil back (1/2 in.)	0.45
7. Inside surface (still air)	0.68
Total resistance	6.36
U=1/R=1/6.36	0.16



Construction	
1. Outside surface (15 mph wind)	0.17
2. Common brick (4 in.)	0.80
3. Air space[b]	0.97
4. Concrete block (stone agg.)(4 in.)	0.71
5. Air space[b]	0.97
6. Gypsum wallboard(1/2 in.)	0.45
7. Inside surface (still air)	0.68
Total resistance	4.75
U=1/R=1/4.75	0.21



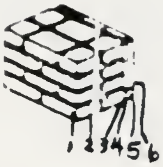
Construction	
1. Inside surface (still air)	0.68
2. Plas. (lt. wt. agg.) 5/8 in	0.39
3. Cement block (cinder agg.)(4 in.)	1.11
4. Plas. (lt. wt. agg.) 5/8 in	0.39
5. Outside wall (15 mph wind)	0.17
Total resistance	2.74
U=1/R=1/2.74	0.36



U-VALUES FOR TYPICAL WALL & ROOF CONSTRUCTION

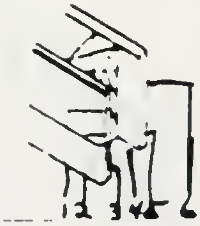
WALLS(continued)

Construction	Resistance (R)
1. Outside surface (15 mph wind)	0.17
2. Face brick (4 in.)	0.44
3. Common brick(4 in.)	0.80
4. Air space[b]	0.97
5. Gypsum wallboard (1/2 in.)	0.45
6. Inside surface(still air)	0.68
Total resistance	3.51
U=1/R=1/3.51	0.29

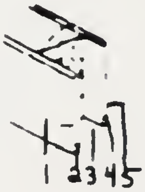


Adjustment for furring (1X2 in.@ 16 in.o.c.)
=U X 1.00 = 0.29 X 1.00 = 0.29

Construction	
1. outside surface (15 mph wind)	0.17
2. Siding, wood, 1/2 in. X 8 in. lapped (avg.)	0.81
3. Sheathing, 1/2 in. asphalt impregnated	1.32
4. Air space[b]	0.97
5. Gypsum wallboard (1/3 in.)	0.45
6. Inside surface (still air)	0.68
Total resistance	4.40
U=1/R=1/4.12=	0.23



Construction	
1. Surface (still air)	0.68
2. Gypsum bd. (1/2 in.)	0.45
3. Air space[b]	0.97
4. Gypsum wall board (1/2 in.)	0.45
5. Surface (still air)	0.68
Total resistance	3.23
U=1/R=1/3.23	0.31



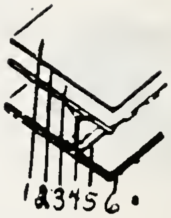
Adjustment for framing (2X4 in @ 16 in. o.c.)
= U X 0.95 = 0.31 X 0.95 = 0.29

adapted from ashrae 72 guide

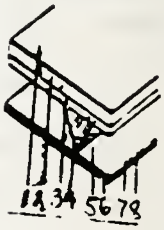
U-VALUES FOR TYPICAL WALL & ROOF CONSTRUCTION

ROOFS

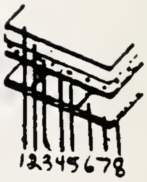
Construction	Resistance (R)
1. Outside surface (15 mph wind)	0.17
2. Built-up roofing (3/8 in.)	0.33
3. Roof Insulation (C=0.24)[b]	4.17
4. Metal deck	0.00
5. Air Space[b]	0.99
6. Metal lath and	
7. 3/4 in. plas. (sand agg.)	0.13
8. Inside surface	0.92
Total Resistance	6.71
C=1/R=1/6.71	0.15



Construction (Heat flow up)	
1. Outside surface (15mph wind)	0.17
2. Built-up roofing (1/4 in.)	0.33
3. Roof insulation (C=0.72)	1.39
4. Plywood deck (5/8)	0.78
5. Air Space[b]	0.85
6. Gypsum wallboard (1/2 in.)	0.45
7. Acoustical tile (1/3 in.) - glued	1.25
8. Inside surface (still air)	0.61
Total resistance	5.83
U=1/R=1/5.83	0.17



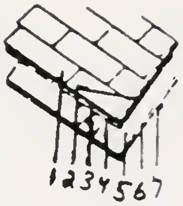
Construction (heat flow up)	
1. Outside surface (15 mph wind)	0.17
2. Built-up roofing - 3/5 in	0.33
3. Roof insulation (none)	-
4. Concrete slab (lt. wt. agg.)(2 in.)	2.22
5. Corrugated metal	0.00
6. Air space[b]	0.85
7. Metal lath and 3/4 in. plas. (lt. wt.agg.)	0.47
8. Inside surface (still air)	0.61
Total resistance	4.65
U=1/R=1/4.65	0.22



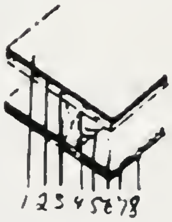
U-VALUES FOR TYPICAL WALL & ROOF CONSTRUCTION

ROOFS (continued)

Construction (Heat flow up)	Resistance (R)
1. Outside surface (15 mph wird)	0.17
2. Asphalt shingle roofing	0.44
3. Building paper	0.06
4. Plywood deck (5/8 in.)	0.78
5. Air space[b] (3.5 in., reflective surface)	2.06
6. Gypsum wallboard (1/3 in.)	0.45
7. Inside surface (still air)	0.62
Total resistance	4.58
U=1/R=1/4.58=	0.22



Construction (Heat flow up)	
1. Top surface (still air)	0.61
2. Linoleum or tile (avg. R)	0.05
3. Felt	0.06
4. Plywood (3/4 in.)	0.78
5. Wood subfloor (3/4 in)	0.94
6. Air space[b]	0.35
7. Metal lath and 3/4 in. plas. (lt. wt. agg.)	0.47
8. Bottom surface (still air)	0.61
Total resistance	4.37
U=1/R=1/4.37=	0.23



adapted from ashrae 72 guide

GLOSSARY

AC	air-conditioning
Ballast	a device used with gaseous discharge lamps such as flourescent tubes to limit current flow and to provide voltage at design level
Building Envelope	the elements of a building which enclose conditioned spaces and through which thermal energy is transferred to or from the exterior
BTU	British Thermal Units; approximately, it is the heat required to raise the temperature of a pound of water from 59° to 60°F
Calibrate	to fix or correct the graduations of (a measuring instrument)
Calorie	a unit of heat quantity; the amount of heat required to raise the temperature of one (1) kilogram of water one (1) degree centigrade; commonly called the kilocalorie
Caulking	a flexible material used to seal up cracks of spaces in the structure
CCF	hundred cubic feet
CFM	cubic feet per minute; a method of measuring air changes, which is the amount of air movement into or out of a building
Circuit Breaker	is a fuse or lever which can break the electric current, either manually or automatically when there is too much demand on the circuit
Coil	a cooling or heating element made of piping or tubing
Condensate	liquid formed by condensation of a vapor; in steam heating, water condensed from steam; in air conditioning, water extracted from air, as by condensation on the cooling coil of a refrigeration machine
Conversion Factors	are given amounts which can convert one form of energy measurement into another; for example, 3413 multiplied by a KWH value would convert the KWH into BTUs; conversely BTUs divided by 3413 would give a KWH measure
Control Devices	monitors and regulators that control any power or energy system; examples: thermostats, timeclocks, etc.

Degree Days (Cooling) (CDD) (DD)	the degree day value for any given day is the difference between the mean daily temperature and 65°F; for a mean daily temperature of 85°F, the number of cooling degree days is 85 - 65 = 20
Degree Days (Heating) (HDD) (DD)	the degree day value for any given day is the difference between 65° and the mean daily temperature; example: for a mean daily temperature of 50°F the number of degree days is 65 - 50 = 15. Degree days are a measure of severity of the entire season and are directly proportional to fuel consumption
Demand Load	electric power measured in kilowatts in 15 minute intervals for commercial operations; the price of electricity is directly related to the level of this demand; the higher the demand, the higher the cost per electric unit
Design Temperatures	refers to indoor and outdoor temperatures for which a building is designed to maintain comfort levels
Diffusers	a circular, square, or rectangular air distribution outlet, generally located in the ceiling and comprised of deflecting members discharging supply air in various directions and planes as arranged to promote mixing of primary air with secondary room air
Dual Duct System	in dual duct systems the outlet at each individual space is supplied with hot and cold air by separate ducts; valves at the outlet proportion the quantities of hot and cold air which are mixed and then enter the space; the single duct system supplies air at a constant temperature to each outlet; the temperature control in the individual space is achieved by varying the volume of air to the space through an outlet control (a descriptive figure is available)
DX Coils	the direct expansion coil is widely used in cooling air; warm air flowing across the fins and tubes of a direct expansion coil surrenders its heat to the boiling refrigerant inside the tubes; when the direct expansion coil is used in a reciprocating compressor refrigeration system, liquid refrigerant as delivered through a float valve or an expansion valve
ECM	Energy Conservation Measure, see retrofit.
Enthalpy	(1) a thermodynamic property of a substance defined as the sum of its internal energy plus the quantity Pv/J: where P = pressure of substance, v = its volume and J = the mechanical equivalent of heat; formerly called total heat and heat content; (2) for purposes of air conditioning it is the total heat content of air expressed in BTU/lb.

Flue	a tube, pipe, or shaft for the passage of smoke, hot air, gas, etc., as in a chimney
Grille	a louvered or perforated covering for an air passage opening which can be located in the side wall, ceiling or floor
GSF	gross square feet - the total number of square feet contained in a building envelope
Helix	any spiral, either lying in a single plane or especially moving around a cone, cyclinder, etc., as a screw thread does
HP	horsepower, units of power in the foot-pound/second system; work done at the rate of 745.7W (550 ft-lb. per sec.)
HV	heating and ventilation
HVAC	heating, ventilation and air conditioning
Infiltration	air flowing inward as through a wall, leak, etc.
Insolation	solar radiation which is delivered to any place on the surface of the earth directly from the sun; the rate of such radiation per unit of surface
Lugs	a heavy nut used with a bolt to secure a wheel to an axle
Maintenance	activities undertaken in a building to assure that equipment and energy-using systems operate effectively and efficiently
MBTU	thousand British Thermal Units (see BTU)
MCF	thousand cubic feet
Multi-Level Lamps	lights that have multiple settings of intensity (brightness)
Multi-Zone System	means each room or other zone has control of its own heating level
Operating	operation of equipment and energy-using systems in a building to achieve or maintain specified levels of environmental conditions or service
Peak Load (Demand)	literally, the maximum load in a stated period of time; sometimes the term is used in a general sense to describe that portion of the load above the base load for electrical billings
Pneumatic	of or containing wind, air, or gases
Portico	a porch or covered walk, consisting of a roof supported by columns, often at the entrance or across the front of a building, colonnade

R-value	Resistance; term used to measure a given thickness of an insulating material's resistance to the flow of heat in units of square feet x hour x degrees Fahrenheit per BTU; the reciprocal of the sum of R-values for a composite barrier is the overall transmittance or U-value.
Recalibrate	to calibrate again - see calibrate
Reciprocal	the quantity resulting from the division of 1 by the given quantity; quantity which multiplied by the given quantity equals 1
Registers	a combination grille and damper assembly covering an air opening
Retrofit	the capital improvement of existing buildings to make them more energy efficient (Energy Conservation Measure)
Rheostat	a device for varying the resistance of an electric circuit without interrupting the circuit, used as for regulating the brightness of electric lights
RIF	relative importance factor; this identifies the importance of one consideration relative to the overall situation
Solenoid	a coil of wire, usually wound in the form of a helix, that acts like a bar magnet when carrying a current; use in brakes, switches, relays, etc.
Terminal System	mechancial delivery system; that system which delivers the hot or cold air to the rooms Types: unitary, parimeter, variable air volume, terminal reheat, heat pump, etc.
Thermal	of, pertaining to, using, produced or caused by heat
U-value	(thermal transmittance); overall coefficient of heat transmission (air to air) expressed in BTUs per square foot, per hour, per degree Fahrenheit; the U-value applies to combinations of different materials used in series along the heat path flow, including air space, and surface air films on both sides; the lower the U-value the less heat is transferred; numerically equivalent to the reciprocal of the sum of the R-values of materials in combination
Utilization Factor	this is a factor use to reflect the percentage of time something is used; for example: outside lighting may be turned on approximately 8 hours in a 24 hour period; this means about 33% of the time which is a utilization factor of .33

VAV	variable air volume
Watt	a unit of power; produced when one ampere flows under electromotive force of one volt; one one-thousandth of a kilowatt
WF	weighting factor - for our purposes this assigns a value to specific circumstances within each RIF
x 10^6	means the number in question has had the last 6 digits cut off and has been rounded off to the figure shown; this is done to make large figures more manageable; example: 1,238,884,687 would be expressed as 1,238.9 x 10^6 or 1,239 x 10^6

APPENDIX G

Monitoring Checklist

COMPLIANCE MONITORING
PART I ECM GRANT BASIC DATA

GRANTEE: ____________________

ADDRESS: ____________________

____

DATE OF TA STUDY: __________ TA FIRM NAME: __________

CONTACT PERSON: __________ TELEPHONE ( ) __________

ADDITIONAL INTERVIEWEES: ____________________

____

GRANT NO.: __________ BUDGET PERIOD: ______ TO ______

FEDERAL $ ______ NON-FED $ ______ TOTAL $ ______

TOTAL BLDGS. UNDER GRANT ______ # BLDGS. TO BE PHYSICALLY INSPECTED ______

ECM'S INSPECTED ______ # ECM's COMPLETED ______

ECM'S IN PROGRESS ______ # ECM's NOT STARTED ______

BUILDINGS TO BE PHYSICALLY INSPECTED:

BUILDING NAME	BUILDING GSF	19__ BTU/GSF	LAST YEAR BTU/GSF

MONITOR NAME: __________ SITE VISIT DATE: __________

SIGNATURE : __________ DATE OF REPORT : __________

BUILDING LIST

GRANT NO.: ____________

BUILDING NAME	ECM'S	$ ESTIMATE	OUTLAYED	% COMPLETE	DATE COMPLETE

PART II
COMPLIANCE MONITORING
FINANCIAL AND PROJECT PERFORMANCE

1. Verify total funds paid grantee, date(s) reimbursed and/or advance approved for payment. Check grantee records for dates and amounts received and disbursed to all contractors.

DOE Payments to Grantee		Grantee Payments to Contractor	
Amounts	Date	Amounts	Date

(Use reverse side for additional space)

Data Source: SF 270's, FSR, and Grantee Records

2. Verify grantee has records of in house labor used and/or payroll records for Davis-Bacon Compliance. (Record Questions/Comments)

DOE Followup Action Required Yes ☐ No ☐

Data Source: Grantee, USDOL Form WH 347 and WH 348

3. Verify effective control over funds and records which identify adequately the source and application of funds for grant supported activities by building and ECM project. (Record Questions/Comments)

DOE Followup Action Required Yes ☐ No ☐

Data Source: Grant File Data and grantee last financial audit report

PART II
COMPLIANCE MONITORING
FINANCIAL AND PROJECT PERFORMANCE

4. Verify all approved ECM's were/are being installed.
   (Record Questions/Comments)

DOE Followup Action Required Yes ☐ No ☐

Data Source: Physical observation, Note: see page 2 of checklist to record ECM statu

5. Explain actual or anticipated problems with contractor performance.
   (Record Questions/Comments)

Data Source: FSR data and grantee records

6. Explain any variances with project schedules.
   (Record Questions/Comments)

DOE Followup Action Required Yes ☐ No ☐

Data Source: Grant records

PART III
COMPLIANCE MONITORING
PROCUREMENT POLICIES AND PROCEDURES

1. Verify if grantee is in compliance with established procurement procedures to ensure maximum and free competition.
   - o Ascertain if "conflict of interest" statement(s) exist.
   - o Contracting with small & minority firms
   - o Solicitation to at least three suppliers
   - o Small purchases not beyond dollar limits of OMB circulars
   - o Other

DOE Followup Action Required Yes ☐ No ☐

Data Source: Reference A or B, Grantee purchasing records & procedures

2. Verify grantee has sufficient procurement records.
   - o Grantee has copies of all applicable program regulations
   - o Rationale for the method of procurement & contract selection
   - o All records maintained for three years
   - o Details for significant history of the procurement

DOE Followup Action Required Yes ☐ No ☐

Reference (A) OMB Circular A 102 and 10 CFR 600
Reference (B) OMB Circular A 110 and 10 CFR 600

Data Source: Reference A or B, Grantee Purchasing Records

PART III
COMPLIANCE MONITORING
PROCUREMENT POLICIES AND PROCEDURES

3. Verify grantee in compliance with "Contract Provisions" of OMB circulars for contracts greater than small purchase type contracts.
   - o Provisions which will allow for administrative, contractual or legal remedies.
   - o Suitable provisions for termination.
   - o Compliance with equal employment opportunity.
   - o Compliance with the Copeland "Anti-Kickback" Act.
   - o Provisions for Federal access to contractor records.
   - o No sole source contracting.

DOE Followup Action Required Yes ☐ No ☐

Data Source: Reference A or B, Grantee purchasing/contract records

4. When required, verify if grantee used "Formal Advertising" as a method of procurement; explain their compliance to OMB circular requirements.
   - o All bids were opened publicly at announced time and place.
   - o Grantee recorded reason(s) for bidder selection other than price.
   - o Low bidder has written firm-fixed price contract.
   - o Two or more responsible suppliers were available.
   - o Specifications for supplies were clear and reasonable.

DOE Followup Action Required Yes ☐ No ☐

Data Source: Reference A or B, Grantee Purchasing Records

5. Obtain copy of grantee's financial system audit. List dates of audit and date submitted to DOE.

Data Source: Reference A or B, Grantee purchasing/contract records

Reference (A) OMB Circular A 102
Reference (B) OMB Circular A 110

PART IV
COMPLIANCE MONITORING
OPERATION AND MAINTENANCE AND ENERGY SAVINGS

1. Review grantee energy management system.
   - TA report useful tool
   - Person assigned manager responsibilities
   - Grantee is recording energy building consumption
   - Future plans for additional ECM work

Data Source: Grantee Records

2. Review Operation and Maintenance program effectiveness.
   - Systematic schedule in place
   - Published internal energy/dollar savings reports

Data Source: TA report and grantee records.
Interviews w/energy managers

3. Identify changes which may have affected building energy consumption.
   - Occupancy/hours of operation
   - Building additions/deletions etc.

DOE Followup Action Required Yes ☐ No ☐

Data Source: Grantee Records

4. Verify schedule/plan for annual energy consumption report to be submitted for 3 years after completion of project.

Data Source: Grantee Records

PART V
COMPLIANCE MONITORING
GENERAL INTEREST

1. Dollar value of ECM's grantee's has installed and/or planned to install without DOE funds.

Data Source: Verbal confirmation

2. Dollar value and resources used or proposed other than federal and institution funds for energy conservation. (Third party funding)

Data Source: Verbal confirmation

3. List all noteworthy, unusual, or innovative occurrences which resulted from this grant award.

Data Source: Verbal confirmation

4. Obtain general program comments from interviewees in regard to program or DOE/SEO staff support.
   - o Grantee would participate in network sharing of ECM project information
     Yes ☐ No ☐